ROCKS AND MINERALS

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A Magazine for Mineralogists, Geologists and Collectors

MAY, 1947

35c

12th LIST OF FINE MINERALS FROM AN OLD COLLECTION.

CHRYSOBERYL, Brazil. Twin xl. group about 1½ inch. ..... $ 3.50
PHENACITE, Brazil. Twin xl., very good, 1 inch. 3.00
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RUTILE, Graves Mt. Georgia. Brilliant xls. in mass. 2 x 1½. 3.00
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MAGNETOPLUMBITE, Langban. Disseminted in Manganophyllite. 3 x 2 4.00
STIBNITE, Felsobanya. Group of brilliant terminated xls. 2¼ x ¾ 2.50
OPAL V. HYALITE, N. Carolina. Heavy blue incrustation on rock. 4 x 3 4.00
SULPHUR, Sicily. Xld. w. xld. Celestite 4 x 3½ 3.50
ARGENTITE, Colorado. Thick filiform masses w. xld. Quartz. 3 x 1½ .. 3.50
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CHALCOPYRITE, Japan. Large xls. invested w. Galena xls. 3 x 3 ..... 8.00
CERUSSITE, Tsumeb. Brilliant xls. on Malachite. 3½ x 3 ..... 10.00
STIBNITE, Felsobanya. Group of brilliant terminated xls. 2¼ x ¾ 2.50
TOURMALINE, Snarum, Norway. Large black well terminated xl. 2¼ x 1¾ 2.50
CORUNDUM, Ceylon. Yellow translucent xl. 1¼" 2.50
TITANITE, Ontario. Loose 1¼" brown xl. 1.25
AZURITE, Tsumeb. Very fine solid loose xl. 1¼ x 1 x ½ 7.50
COBALTITE, Columbus Mine, Cobalt, Ontario. Bright loose xls. about 3/16". 5 for $2.00. Similar xls. in matrix, 3 x 3 ..... 5.00
IRON METEORITE (SIDERITE), Canyon Diablo. Complete, 5 x 2½ x 2½, one end polished. 3 lbs. 8 oz. 20.00
ZINCITE, Franklin. Foliated w. Franklinite. 1¾ x 1¾ 1.50
Many other Zincite specimens from small to large sizes, enquire.
ATACAMITE, Tocapilla, Chile. Xld. mass. 3 x 2 ..... 5.00
Another 4½ x 2 ..... 7.50
BEMENTITE, Franklin. Xlline. plates in mass. 4 x 2 x 2 ..... 5.00

HUGH A. FORD

OFFICE AND SHOWROOM: 110 WALL STREET NEW YORK 5, N. Y.

Telephone: BOwling Green 9-7191

No lists furnished, but enquiries for specific minerals welcomed.

ROCKS and MINERALS
PUBLISHED MONTHLY

Edited and Published by
PETER ZODAC

MAY
1947

CONTENTS FOR MAY, 1947

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The official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

THE ROCKY MOUNTAIN FEDERATION OF MINERAL SOCIETIES CONVENTION, SALT LAKE CITY, UTAH, JUNE 12-15, 1947

Plans for this convention are progressing nicely and from inquiries already received, will have a good attendance. There are many things and places of interest in Utah, so why not plan your convention to include these dates in your itinerary.

Highlights of meetings and the field trip of Topaz Mountain have already been noted in earlier announcements.

For further information, write to:

Prof. Junius J. Hayes, President
University of Utah
Salt Lake City 2, Utah
or to
Mrs. C. W. Lockerbie, Sect'y-Treas.
223 West 9th South Street
Salt Lake City 4, Utah

We Want The Report

From time to time, a reader informs us that he has found an unusual or a new mineral (for a locality) and would we like a report. Our answer is YES. In fact, it is not necessary to send us an inquiry—write the report and send it in. We would be glad to have it and it will be printed.

Some Suggestions!

Editor R&M:

I would like to make the following suggestions:

In an early number of *Rocks and Minerals* ask all clubs to send you the names and addresses and phone numbers of two or three suitable members. Then you arrange this information alphabetically as to states and cities as in a directory and include same as a tear-sheet in the next number. This summer hundreds of rock hounds will go on collecting trips, hundreds if not thousands of miles. With this tear-sheet in his pocket a collector can route his trip intelligently. When in a given town he can phone listed members, learn what minerals to look for in that locality and where to find them.

Publish pictures of small and average size collections, showing how specimens are arranged. Tell us something about each collector, how long he has been at it, his mineralogical library, lapidary equipment, etc.

Have an article on how to go about collecting when in a strange locality—who or what class of people would be likely to assist. This is a difficult subject but perhaps some experienced collector has worked out a system that would be helpful to novices.

April 5, 1947

Geo. C. Olmstead
Signal Mountain, Tenn.

Living up to promise!

Editor R&M:

It has been a long time since I loosened up the writing arm in an epistle to you! I have thought of you plenty—how could that be otherwise with at least a monthly reminder thru eagerly awaited R & M magazine. 24K stuff—boy—swell & scrumptious! You are more than living up to your "bigger & better magazine" promise.

Please send me a copy of "Hints to writers for R & M" pronto. I'm getting set to bat out some material for you but several good reasons have held me up.

March 31, 1947

Roland O. Betterly
Pottstown, Penn.

A Lapidary Shop for New York City!

Editor R&M:

I am wondering how many rockhounds in and around New York City would care to form a lapidary shop—a place where they could come to cut and polish their own stones.

If such a shop was formed, I could teach the members how to cut, shape, and polish stones and other tricks of the trade. I've been in the business for over 20 years.

I would like to hear from all readers of *Rocks and Minerals* who would be interested in a lapidary shop.

April 28, 1947

Ferdinand Rollas
666 Willoughby Ave.,
Brooklyn 6, N. Y.

ROCKS and MINERALS

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MAY 1947

CORUNDUM IN SOUTHERN AFRICA

BY ROBERT W. METCALF[1]

(Bureau of Mines **Mineral Trade Notes,** Feb. 20, 1947)

INTRODUCTION

During the war there was a great increase in the demand for corundum for use in manufacturing military equipment in the United States. Severe shortages developed, and the Foreign Economic Administration sent representatives to Africa to try to stimulate production. The success of this program is indicated in the following report.

The material for this study was assembled for publication from various unpublished reports and correspondence, detailing the corundum procurement program and reflecting changing conditions in the African industry. Special acknowledgment is due to Lawrence E. Putnam, Principal Representative, U. S. Commercial Co., Johannesburg, and Minerals Attache William O. Vanderburg, Pretoria, Union of South Africa, whose full and complete reports form the basis and backbone of data presented in the following pages.

For many years the Union of South Africa has been the most important producer of corundum. This material is mined from both "reef" and eluvial deposits largely in northern and northeastern Transvaal. The rocks in which corundum occurs as a primary constituent in northern Transvaal are scattered over an area of more than 3,000 square miles, centering around Bandolierkop. They are lenses or veins intruded into basic rock masses.

Of the primary occurrences, the plumasite deposits in northern Transvaal are the most widespread. The typical plumasite rock is composed of feldspar and dull-gray crystals of corundum. The marundite deposits are found in the eastern part of the Transvaal corundum area. The typical marundite is a coarsely crystalline rock in which the corundum is embedded in scaly or rosette-shaped aggregates of margarite.

Corundum deposits of the gneissic type are less common, but they occur in several important areas. In this type, the corundum rock is composed of feldspar-biotite gneiss. As corundum is highly resistant to weathering, it is found in detrital or eluvial deposits, usually in close proximitiy to the primary corundum-bearing rocks. In the past, a large part of the material produced was derived from the detrital deposits.

In 1945, the output of corundum in the Union of South Africa totaled 4,827 short tons, a considerable increase over the 3,892 tons reported in 1944.

TRANSVAAL

Eluvial corundum.—In the Transvaal, the output of eluvial crystal corundum was aided to come extent by the severe draught during 1945 in the northern part of the area. This prolonged dry spell was pretty generally broken in January 1946. The crop failures in 1945 caused more farmers to exploit the corundum on their farms, and many natives, mostly women and girls, gathered crystal, which they exchanged for "mealie meal." The individual output of these women was small, sometimes only a pound or two per day, but with several hundred in the field the aggregate output was substantial. Production during this period was limited by the very acute shortage and high price of maize.

The period of lowest corundum production during the year normally extends from January through March, as mining

1 Assistant mineral economist, Nonmetal Economics Division, Bureau of Mines.

this mineral definitely is a part-time business. Most of the diggers either own farms or work on farms. Plowing starts at the beginning of the rainy season. Planting and cultivation then commence and continue until March. Output of corundum in later months also often is dependent on the abundance of the crops. In long periods of dry weather and resultant poor crops the natives bring in more corundum than in seasons when the harvest is plentiful.

The mining of Piet Retief deposits in southeastern Transvaal, adjoining Swaziland, which had been considered a promising area, ceased before the middle of 1945, not from exhaustion but because of the difficulties of transportation and royalties. Negotiations for the exploitation of additional farms in this area were terminated at the end of the war. The region is known to contain at least several hundred tons of crystal.

A small amount of eluvial crystal continues to come from the Low Country in eastern Transvaal, where corundum occurs in considerable quantity over an area of approximately 1,000 square miles, centering about Mica Siding. Much of this corundum is altered to margarite, and considerable care must be exercised in mining. In the Selati district, which lies in about the middle of this area, the margarite is less prominent, and production of "micaceous boulder" for concentrating purposes is expected to increase.

The total eluvial production in the Transvaal was expected to trend gradually upward, and this would have supplemented concentrate production.

An unlimited market and growing confidence of getting an adequate price for their product were having the effect of increasing digger activity. New farms were being opened, and several large low-grade eluvial paddocks were discovered. The Union Government furnished considerable aid by extensive trenching and pitting. A bulldozer and portable screening plant were ready to test the feasibility of exploiting these low-grade paddocks on a relatively large scale. However, this program was terminated at the end of the war before it reached production stage.

In summary, it appeared that while the production of eluvial crystal in the Transvaal could, under stress of war emergency, be maintained at about 200 tons per month for several months, depletion of the fields over the past years must inevitably result in a progressively decreasing production. It is unlikely in normal times at current or even slightly higher prices, that the output of Transvaal eluvial can be maintained in excess of 100 tons per month.

Reef crystal.—For many years the digger output supplemented and at times surpassed production of eluvial crystal by exploitation of decomposed reefs. Confronted in the past with considerable price differenital in favor of size, the digger did as little crushing as possible, and by hand-cobbing and the use of beater mills attempted to extract crystal as nearly whole as possible, depending on tumbling devices to remove the adhering gangue and screening and hand-jigging to separate the corundum. Varying degrees of success were attained, depending on the state of decomposition of the gangue and the character of the crystal. In all cases, however, the procedure resulted in a dirty product, particularly in the smaller sizes, and an exceedingly low extraction.

A small tonnage of reef crystal will continue to be produced as long as there are diggers in the field. In the great majority of cases better recoveries and a cleaner product could be obtained by producing concentrates, but crystal production still remains, in some instances, the most economic means of recovery. This is particularly true of the farm Palmietfontein in Northern Transvaal, where well-shaped crystals weighing 1 to 10 pounds are separated quite readily from loosely adhering feldspars by hand cobbing.

Attempts to "wean" the digger away from this practice were not too successful. The Union of South Africa Government staged field demonstrations, using a small portable plant consisting of a crusher, screen, and jig and attempted to induce

individual diggers to install this equipment. The United States Foreign Economic Adminstration advocated the hauling of the ore a somewhat greater disance and its treatment in a considerably larger, more efficient plant. Neither method accomplished any tangible results.

During the first few months of 1945, this reef crystal accounted for one-quarter to one-half of the total crystal production in the Transvaal and averaged perhaps 50 tons a month.

Concentrates.—If the Transvaal is to continue to supply most of the world's corundum, it has become increasingly apparent that concentrates must be substituted progressively for the decreasing supply of crystal. In spite of some trade prejudice, there appears to be no real reason why plumasite concentrates cannot be used for wheel grain, even though boulder concentrates may continue to be useful only for optical purposes. Buyers, too, must realize that price differentials should be based (within the limits of usability) upon purity rather than size.

No large corundum reefs of sufficient size and grade, such as would support even a 25-ton daily-capacity plant for any considerable time, are known to exist, but throughout Northern and Eastern Transvaal are many small deposits, containing 20 to 50 percent corundum, the ore from which could be transported by truck and rail to centrally situated concentrators. At $103 per long ton, an economic production in excess of 3,000 tons per year of concentrates (excluding boulder) could be maintained for several years. Any future emergency involving corundum will probably have to rely on this source.

Boulder.—The production of straight boulder is unpredictable. The deposits always are small, sometimes only a few tons, and invariably associated with low-grade boulder and plumasite in unknown proportions. Including undergrade concentrates, the total quantity mined should not fall below 100 tons a month in normal periods.

Boulder concentrates proved to be satisfactory for optical uses, but it is extremely doubtful, owing to the small size and intergrown nature of the corundum crystal, that concentrates having sufficient size and purity for use in high temperature bonded wheels can be made from boulder.

SOUTHERN RHODESIA

The main occurrence of corundum in Southern Rhodesia is in a zone about 50 miles long extending from Marandellas to Rusapi on the road from Salisbury to Umtali. There are three main areas of occurrence in this zone—Toramundi, Barbara, and Rusapi—from all of which there has been some small previous production.

The Barbara field lies about 15 miles from Toramundi. The corundum is entirely eluvial and has no adhearing margarite but does contain a rather high percentage of iron oxide. The corundum here is the best over-all quality and this is the richest field so far seen in Southern Rhodesia, but the deposits are not very extensive. Both the Barbara and the Toramundi fields have been worked unsuccessfully in the past.

The Rusapi field is about 50 miles from Marandellas and consists chiefly of low-grade (5-percent) micaceous reefs. Production from this field largerly was reef crystal, although it has included some high-quality eluvial.

Other less important occurrences are known, as follows: Corundum occurs about 3 miles from Beitbridge, near the Transvaal border. Most of this is low-grade boulder. Possibilities for crystal are poor. A sample also was received from the Mazoe Valley, about 30 miles from Salisbury. Near Concession Siding, about 40 miles from Salisbury, occur numerous out-crops of alumina-rich rock assaying over 90 percent Al_2O_3 and having the specific gravity of corundum. The material, however, lacks the characteristic crystalline structure of corundum and has been reported to be unsuitable for abrasives.

Small shipment were made from the main areas of corundum occurrence in Southern Rhodesia in 1942, after which production languished. Short-lived, small-scale mining was begun early in 1945 in the Toramundi field in the Marendellas area. Active operation was not started again until after the middle of the year, when production was resumed in that field and output was reported also in the Rusapi district.

These operations were only beginning to be effective when the war ended, and the full possibilities of Southern Rhodesian production were never realised for several reasons. The chief difficulty was that in both the Toramundi and Rusapi fields the corundum, mainly eluvial, contains a high percentage of margarite-mica coated crystals, which had to be rejected by hand. The core of these crystals, however, is good-quality corundum, and laboratory tests in the Rhodesian government laboratory at Salisbury indicated that a high-quality crystal concentrates could be made by simple crushing and jigging. Plans therefore were made to install a small field plant. This would have doubled the amount of corundum available. Other than providing an outlet for the productioin started, no further encouragement was given the producers after the end of the war. Development of the third prospective producing area, the Barbara field, did not reach production stage.

Under proper direction, a small, steady, monthly output of perhaps 25 tons of crystal and crystal concentrates, consisting mainly of eluvial with possibly some reef crystal or concentrates, could be maintained over a considerable period from the Southern Rhodesian deposits.

MOZAMBIQUE (PORTUGUESE EAST AFRICA)

Virtually the entire production of corundum in Mozambique (approximately 2,000 tons) has come from one small area known as Canchoeira, not more than 10 square miles in extent, 32 kilometers from Tete on the road to Blantyre, Nyasaland. In spite of intensive prospecting, no extensions approaching the richness of this producing area have been found in this region either to the southeast or the northwest, the prevailing trend of the corundum-bearing rocks.

The development of the Canchoeira deposits mainly has been the work of R. Paes, of Tete, who sold his product to the Gifter Corundum Co. either at Benga, the loading point on the Zambesi River for the Moatize coal mine, or at Blantyre. Production, however, was small, and further inducements were offered by FEA to stimulate a larger output.

Mr. Paes made an arrangement with the manager of the Moatize coal mine to take over operation of the field. This agreement was mutually advantageous. The former gained the services of an experienced engineer, whereas the latter was able to utilize his native labor force more efficiently and more continuously throughout the year. Moatize is only 15 kilometers from Canchoeira. Skilled labor could therefore be diverted to Canchoeira, particularly during the 5 or 6 months when the coal mine is closed down or on short production owing to the close of navigation on the Zambesi River.

The new manager pursued an energetic program of prospecting, development, and road-building. Also, the senior mining engineer for the Portuguese Government, stationed at Macequece, surveyed the area and promised a small field party for prospecting and mapping. Production however, ceased soon after V-J day.

A small tonnage was produced near Zobwe, where the Nyasaland field extends into Portuguese territory, and some further small production might have been possible had the emergency continued.

About 100 kilometers south of Vila Pery, on the Macequece-Beira Road, a pegmatite containing large crystals of corundum was uncovered during the construction of a logging road. The Government Mines Department at Macequece received several samples of good-quality eluvial material purporting to come from the same district. Small-scale development has been promised, but not accomplished. If workable deposits can be found, their development will be facilitated by the availability of relatively good transportation.

NYASALAND

The only area producing corundum in Nyasaland has been on the Mozambique-Nyasaland border near Zobwe, on the Tete-Blantyre road. The district, which is called Thambani, covers about 200 square miles, a small part of which overlaps Portuguese territory. Four known fields, called locally Thambani, Chintalo, Ntondwe, and Kalanga, separated from each other by 4 to 6 miles, have been prospected, and there is every reason to believe that others will be discovered. Most of the material is eluvial, but there are several outcroppings of corundum-bearing pegmatites and gneisses that may have future possibilities.

On the whole, Nyasaland presents the best prospect for increased production of eluvial crystal. While not equal to the quality of material from Northern Transvaal, it is better than the Mozambique product. The bulk of production so far has been from two fields, Thambani and Kalanga. In the middle of 1945 only the Thambani field was being worked, although considerable corundum remains at the Kalanga operations. The Chintalo and Ntondwe fields have not been exploited. Difficulties have been excessive transport costs and the short duration of contracts, which have militated against thorough exploitation and development.

NAMAQUALAND

Two corundum occurrences are known in Namaqualand, Cape Province, one near Steinkopf, about 40 miles north of Springbok, and the other on and near farm Klein Pella, about 30 miles south of Pofadder. Past production has come almost entirely from Steinkopf, where there are a few scattered eluvial paddocks and a single band of corundum-bearing pegmatites and micaceous reefs extending more or less continuously for about half a mile. The eluvial crystal is of good quality, but much of the reef crystal is badly altered. A small tonnage is still recoverable from paddocks, and attempts were made to get the owners to produce in greater quantity.

Little, if any, high-quality eluvial is left in areas near Pofadder. Numerous outcrops of flat-lying micaceous reefs containing 15 to 20 percent corundum occur. The corundum has many mica intrusions, but no other contaminations.

Two occurrences other than those in Namaqualand have been reported in Cape Province, one at Port Herald and the other about 200 miles beyond the railhead in the northwestern portion of the country. Reports of these occurrences were meager, and no samples were available.

In the Cape Province, the deposits are small, transportation is costly, and labor scarce. Any appreciable production is problematical.

TANGANYIKA

Deposits have been reported near Dodoma. Judging from tests on a sample from this region and the type and location of the deposits, the possibilities for large-scale production appear to be limited. Only a few tons have been produced and for local consumption only.

MINING AND RECOVERY

Methods of mining and recovery in the Union of South Africa and other African production areas, are relatively primitive. They remain substantially similar to those reported in 1935 by Kupferburger in his bulletin, Corundum in the Union of South Africa:

> The methods of mining and recovery of corundum in the northern Transvaal and the results achieved must be considered in the light of local conditions such as the mode of occurrence, distribution of the deposits, value of and the demand for the various types of corundum produced.
>
> Some of these conditions may be briefly summarized as follows:
>
> (a) The deposits are generally comparatively small, irregular in form, variable in corundum content, and occur sporadically over a very large area.
>
> (b) The country is generally flat, soil-and bush-covered, and water is relatively scarce.
>
> (c) The only type of corundum for which there has been a fairly constant market, although the demand has fluctuated considerably, is crystal corundum.
>
> (d) The output from the individual workings is small and varies from less than a ton up to about 30 tons a month.

(e) On the whole the average profit to the producer for the effort and expense involved is relatively small.

For these reasons large-scale mining and recovery operations have never been attempted. The production of corundum has always been carried on by a large number of diggers working intermittenly on a small scale and in most cases with little or no capital.

In general the corundum is mined and recovered from shallow open workings, few of which penetrate to depths greater than 20 feet, although in some of the deeper workings on narrow vein-like deposits, a certain amount of underground mining has been done. At most of the eluvial and many of the reef workings no mining appliances other than picks and shovels are used, except for some hand drilling and blasting in hard rock. As with the mining, the recovery methods employed likewise are crude and often wasteful. Most of the operations are performed by manual labor, sometimes implemented by simple and home-made mechanical devices.

As stated previously, corundum in the northern Transvaal occurs both as primary and eluvial or secondary deposits. The primary deposits of corundum-bearing rock generally occur as roughly lenticular intrusions, both vertical and horizontal, or as irregular veins in masses of dark basic rocks. They invariably show the typical pinch and swell behavior that makes large-scale mining virtually impossible. Several attempts since 1935 to mine on a larger scale were unprofitable and ceased before reaching the 100-foot depth. In most cases, these workings now are filled with waste or are in such state that mining operations are impossible at present. No authentic reports of depth or reef value at the time of closing are available.

The eluvial deposits have been the most extensively worked in the past and are almost exhausted. This source, however, has been supplemented somewhat by retreatment of old tailings dumps.

USES

In service, South African corundum breaks down gradually and continually presents a new series of sharp-edged facets during the life of the individual crystals. The grinding surface, therefore, is always clean and fresh. This results in cooler grinding action. This advantage is most apparent with the coarse-grit vitrified-bond wheels, such as are commonly used in the snagging of steels and annealed malleable iron. Also, a definite advantage exists in lower grinding costs. Because of the cooler grinding, there is less breakage from heat, and the occupation is made less hazardous to the operators.

This feature of new and fresh grinding surfaces also has exceptional value in the grinding and polishing of optical instruments and lenses, as it allows the manufacture of the velvet-smooth and scratch-free glass and instrument parts which are essential in delicate optical equipment.

Virtually the only importer of corundum during the war was Watson, Geach & Co., Inc., 120 Broadway, New York 5, N. Y. Their supplier was the Ore & Metals Co., (Pty.) Ltd., Johannesburg, South Africa, the firm handling the corundum export business for the Gifter Corundum Co. The Gifter Corundum Co. at present is the only large company in the corundum industry in the Union of South Africa. In addition to its own output, it purchases virtually all of the corundum produced in other operating areas in Africa. The corundum received by Watson, Geach & Co., Inc., was shipped to the American Abrasive Co., Westfield, Mass., for reduction, sizing, and marketing. Another American firm occasionally importing corundum is E. J. Lavino & Co., 1528 Walnut St., Plymouth Meeting, Pa. (Philadelphia, Pa.)

DIAMOND LECTURE GIVEN BEFORE THE DISTRICT OF COLUMBIA MINERALOGICAL SOCIETY

BY HARRY L. WOODRUFF, C. G. Feb. 21, 1947

Long before the dawn of history, primitive man was attracted by shiny pebbles, which may have been minerals or gems of worth, and perhaps worn before clothes. They have adorned statues of the Gods of all peoples. They have their place in the description of heaven in the religion of almost every race which has left a written record. They have been the most prized possessions of royalty, the cause of famous robberies and assassinations. They have financed destructive wars and used to ransom kings. The history of some gems still existent cover more years than some modern nations. However, compared to gems "which like man have grown," man himself is but a very recent newcomer upon the earth. The length of time it takes a gem to grow is unknown, but the time which has elapsed since it ceased to grow can be estimated. The scriptures tell us of many stones, but make no mention of the Diamond. The Lord gave Moses complete instructions for the making of the breastplate for the High Priest Aaron, who was the brother of Moses. However, some authorities place the diamond as the third stone in the second row, but it is the writer's opinion that this is incorrect, as the name of each Tribe of Israel was engraved on each stone, and diamonds were not cut until the 15th century, much less engraved. This breastplate contained twelve stones and each stone represented one of the twelve tribes of Israel. It seems that the first breastplate became lost or stolen—at least it disappeared, and when the New Jerusalem was formed, another breastplate was made, and the stones in this one were named after the twelve Apostles. This is where we get the birthstone list from.

The earliest records of man show that he valued a very hard stone more for its hardness than its beauty, and this must have been a diamond. In all probability diamonds did exist at this time, but they were so hard they could not be worked with tools of this period. The diamond is thought to have formed deep in the bowels of the earth about sixty million years ago. The Greeks had a word for diamonds, and they called them "Adamas" after a mythological character of the same name who was famous because he was such an uncompromising fellow—a man whom we would today call a "tough guy." This is where we get the name for the lustre of the diamond "Adamantine."

DIAMONDS FIRST FOUND IN INDIA

The earliest record we have of diamond deposits were located in India, and were being worked about the year 1000 A.D. They were discovered in sedimentary deposits that cover the eastern part of the Decan plateau. The diamantiferous sandstone of India is of very wide distribution. It belongs to the oldest division of the sedimentary formations of the country which usually rest directly upon the still older crystalline rocks such as granite, gneiss, mica-schist, hornblende-schist, and similar rocks. Fossils have not been found in these sandstones, so that it is not possible to determine exactly to which of the European formations they correspond in age. They may, however, be safely stated to belong to the Palaeozoic period and to the Silurian division of the period. The diamonds were recovered from beds of streams and from the banks high above the present river beds. The stones were recovered by washing or panning the dirt with a large round shallow pan called a Batea—much the same as gold was panned in the early days in California during the Gold Rush.

The main workings were along the Penner and Kistna rivers in the south—and Godivari and Mahanadi in the central and the Brahmani and Ganges in the north. The business flourished and the city of Golconda in south central India became the market place for a large percent of the stones recovered; here also

were established cutting works. The cutting was rather crude as compared to modern diamond cutting. The stones were not cut in the same shape as they are today—but were just polished with flat places on them and retained much the same shape as when they were found. Diamonds were not cut until about the 15th century. The famous French gemologist and diamond merchant, Travenier, who traveled through India in 1665, reported a flourishing business by the native rulers who owned and operated the diamond workings, employing several thousand workers.

Most of the large diamonds of History come from India, and the stones were of a very fine white. Some dealers still term a fine white stone a "Golconda" diamond. Later on, stones began to be sent to Europe to be cut, as cutting works had now been established in Paris—and many of the large diamonds have been recut with a large percent of loss in weight, but with a much larger per carat price on account of the increased brilliancy and beauty.

DIAMONDS DISCOVERED IN BRAZIL

About this time when the deposits in India began to play out, diamonds were discovered in Brazil, South America. In 1725-28, the deposits were of the same type in beds of streams and on high plateaus between rivers. These plateau deposits were called "Massa."

The diamondiferous sandstone of Brazil resemble those of India in some respects, but have some features that are distinctly different. The diamonds are found only in a sedimentary deposit called "Itacolumite," which is a hydrated mica-schist accompanied by quartzite. Breccia and conglomerate in Brazil produce no diamonds. Associated with the Itacolumite are slate and limestone that contain fossils. These fossils belong to the Devonian age and most likely to the Silurian division. Like India, these sedimentary deposits rest on older crystalline rocks, gneiss, mica-schist, hornblende schist and similar rocks. The main deposits are in the Diamantina and Bagagem districts of Minas Gerais County and in the district of La Isabel de Paraguassa in the county of Bahia. The rivers that produce the stones rise in the center of these districts and flow away from them in all directions. Some few stones are also produced in Goya, Giaso Mogul and Matto Grosso counties. The Paraguassa district is the only district that produces Carbonado, the porous round black stones that are the hardest of all the diamonds.

DIAMONDS IN SOUTH AFRICA

In the beginning, the Indian trade put up all kinds of stories about the Brazilian stones. They said they were very brittle, and some said they were so hard they could not be cut. The South Americans were not to be outdone, so they took to shipping their stones to the Portugal market and seling them as Indian goods. Portugal owned Brazil at that time, and the government almost taxed the mine owners out of business. Finally, the supply in Brazil began to diminish and in 1867, diamonds were found in South Africa on the land of a Boer farmer. A man by the name of Schalk Van Neikirk was visiting a neighbor, and the neighbor's wife gave him a bright stone the children had been playing with. He showed it to a a Jewish traveler by the name of "John O'Reilly" who in turn took it to Grahamstown, and displayed it to W. Guybon Atherton, a Minerologist, who pronounced it a diamond. It weighted 21¼ carats. After being displayed at the Paris Exposition in 1869, it was sold to the Governor of Cape Colony for 500 pounds. Later on this same Van Neikirk appeared with a stone he had procured from a native who picked it up on the bank of the Orange river. It weighed 83½ carats. By this time, the word had gotten around, and 1869 saw the diamond business well established. The first workings were the same as in India and Brazil, but soon the discovery was made that deposits existed deep down in the earth and shafts were started. These were later called pipes, on account of their shape. Much has been written, and many theories have been advanced as to the origin of the material that filled these funnel-shaped workings. In the beginning, the pipes were worked as open workings, with claims 31 feet square leased to the miners. After the open

workings had reached a depth of several hundred feet, the reef, or side wall, began to cave in—also some of the claims caved in, and that system had to be abandoned for a shaft and tunnel type. About this time a man by the name of Cecil Rhodes began to acquire title to some claims, and also to some mines. He was opposed by a man named Barny Barnato and his brother, who were sons of a Jewish Rabbi. Their real name was Isaac. The battle for control of the industry makes very interesting reading—and finally resulted in the two consolidating their interests under the name of the De Beers Syndicate Ltd., of London, which is part of the Diamond Trading Company Ltd., which, with its affiliate the Diamond Producers Association, controls 85% of the world's output in diamonds today. The stones are offered for sale at what is known as sights, and each parcel or paper contains all grades of goods—poor, medium and good—and must be purschased that way. In 1938, 96% of all diamonds came from South Africa. The cutting of diamonds as it is done today, has developed into a fine art. It comprises five parts.

First, the stone is examined and marked with India ink, just where it is to be cleaved or sawed. Second, it is then sawed or cleaved to the approximate shape. Third, it is now mounted in a lathe and turned to the shape of a toy top. Fourth, the first 18 facets are now put on by the lapper and Fifth, the last 40 facets are put on by the brillianteer or polisher. The lapping and polishing is done on what is called a skief—and looks much like a phonograph record, and is made of case iron.

SOME PROPERTIES OF THE DIAMOND

The fact that the one and only constituent of a diamond is pure carbon was already known at the end of the 18th century, and was suspected even earlier than this. In 1675, Sir Isaac Newton had arrived at the conclusion that diamond must be combustible. Diamonds were exposed to the intense heat of fierce charcoal fire, or were placed in the focus of a large burning glass. A stone so treated did not fuse, but gradually decreased in size, and finally disappeared, leaving behind no appreciable amount of residue. The temperature at which diamonds must be heated in the air before combustion is started is just a little lower than the melting point of silver, about 916° C. Diamonds crystallize in the cubic system with the one element, carbon. Therefore, we have a gem entirely diffrent from any other as regards atomic structure. The atomic structure of other gems is built from molecules composed of atoms of two or more elements. To demonstrate the hardness of the diamonds, Crookes in 1905 performed an experiment of subjecting a diamond to sixty atmospheres of pressure and the diamond was seen to sink into mild steel, as though it were butter. The hardness of diamonds, compared to other gems is said to be 140 times harder than either sapphire or ruby, the next hardest gem material.

The diamond is the least compressible of minerals. This quality is probably the result of the closeness with which the carbon atoms are packed together. The relative compressibilities of some substances are Diamond 18, Topaz, 51, Steel 68, Emerald 75, Copper 86, glass 250. These numbers mean that under a certain pressure, diamond will be reduced in volume about one fourth as much as steel.

The volume of a diamond is but slightly affected by temperature changes. The amount of expansion of volume of a substance when its temperature is raised is known as its thermal expansion. The relative thermal expansion of a few gem substances are: Emerald .017, Diamond .035, Spinel .179, Topaz .214 Glass .250, Garnet .254 Quartz .353 Steel .397

It is apparent that if a diamond containing any of the above minerals other than Emerald is subjected to considerable raise in temperature, the inclusions will expand much more rapidly than the diamond, and create a very appreciable internal strain—perhaps enough to cause breakage. Although the atomic weight of carbon (12.00) is among the lowest of elements contained in gem stones, the close packing of atoms increases the specific gravity above that of quartz and similar gems.

SOME LOST MINERAL LOCALITIES OF NEW ENGLAND

VI. Olivine of Chester, Mass.

BY PROF. CHARLES PALACHE
Cambridge, Mass.

One of the strangest stories of a lost mineral locality is tied up to the forgotten name hampshirite. If one looks for this name in Dana's System he will find it on page 675, listed under serpentine but described there as a steatic pseudomorph having mostly the form of quartz. For the fuller history of the name one must go to that extraordinary compendium of the early history of mineralogy in New England *A Mineralogical Lexicon of Franklin, Hampshire and Hampden Counties, Massachusetts,* written by B. K. Emerson and published in 1895 as Bull. No. 126 of the U. S. Geological Survey. Here on pages 91 and 92 will be found the early references to the name and on the plate opposite page 146 a reproduction of the unique and apparently only surviving specimen of the mineral to which the name was given.

This specimen was discovered by Emerson in the collection of Smith College bearing the label "Hampshirite; steatitic pseudomorphs after quartz; Chester, Mass., on the road to Middlefield. Locality exhausted and filled up with rocks to prevent anything more being taken from it. From Rowe's collection." The specimen is correctly described by Emerson, pg. 92, as a serpentine pseudomorph after olivine, but he was puzzled by his failure to find in his thin sections of the Middlefield serpentine any relic of olivine.

The next chapter of the story is to be found in a paper by A. D. Roe and A. L. Parsons entitled, *A. Mineral resembling Meerschaum from the Serpentine Range of Hampden Co. Mass, with Descriptions of Interesting Included Crystals,* which was published in the Bull. of the Minnesota Acad. of Science, 4, 1906.

The Rowe of the label above given is probably a mistake for Roe. In this paper Roe describes the locality and the finding by himself of all extant specimens of hampshirite. That name is newly defined as a serpentine confined to the pseudomorphs; while the new name hampdenite is coined for the serpentine of the matrix rock. The pseudomorphs are here believed to have been derived from humite not olivine.

It was through a series of fortuitous circumstances that the writer was enabled to give a final solution to the questions of exact locality and nature of this unusual specimen. During a visit to Chester I met a local collector, Mr. E. L. Cowles, and found among his many specimens from the neighboring hills one which I could not identify. Study in the laboratory proved it to be olivine in fairly large, imperfect crystals; during a subsequent visit Mr. Cowles led me to the place where he had found the olivine; and abundant material for investigation was secured.

Mr. Cowles had happened along when a gang of trackmen were widening the right-of-way of the Boston and Albany Railroad just where it enters the gorge of the Westfield River at a point very near the boundary between the towns of Chester and Middlefield. He collected the unknown mineral there and noted the point, several hundred yards away, where the excavated material was being dumped. We found that the olivine occurred in a narrow, two-inch vein cutting massive serpentine. The crystals of olivine were rounded and not so distinct as those in the historic specimen; but like those, they were embedded in matted chrysotile and associated with large anhedra of magnetite. There was in addition a small amount of brucite in association. The results of my study may be found in a paper on the *Occurrence of Olivine in the Serpentine of Chester and Middlefield, Mass.,* in Amer. Jour. of Sci. 24, 491-495, 1907. The analysis showed it to be olivine with but a slight alteration to serpentine and brucite. Olivine was also found abundantly in the matrix serpentine proving this to have been derived from a peridotite.

So this old locality is again lost for

weathering soon obliterated all sign of the narrow vein in the rock cutting. But interest in the locality is not confined to its rediscovery. The occurrence of this regenerated olivine in a vein in serpentine itself derived from an olivine rock, has its parallels. It was first reported by Weinschenk in the Tyrol; Warren has described hortonolite reforming in veins in serpentinized peridotite at Iron Mine Hill, Cumberland, R. I. And in a recent issue of this magazine on the famous peridote (or olivine) mines of the Island of St. John in the Red Sea a clear picture is given, for the first time in print I believe, of veins with olivine crystals projecting from the walls, cutting massive serpentine which is derived from the peridotite mass which occupies the island.

CENTRAL TEXAS—THE ROCKHOUNDS' PLAYGROUND

BY J. ROBERT MOORE III
Box 5062, A. & M. College
College Station, Texas

For the sportsman-rockhound who wishes to combine a summer vacation with a profitable collecting trip, a visit to the Central Mineral Region of Texas could not be surpassed. This area is not only rich in varied mineral deposits but also affords excellent opportunities for fishing, hiking, and camping. Here is a locality which enables the mineral collecting enthusiast to study mineralogy in the field and to secure specimens of quality. Buchanan Lake—crystal clear and abounding in fish—is located in the center of the Central Mineral Region between the towns of Llano and Burnet. Numerous establishments around the lake shore rent boats and tackle and provide lodging. Several "old timers" are always on hand to guide the inquisitive rockhound to the nearby mines and mineral deposits.

Quarries, mines, and open pits are found by the score in the hills which surround Lake Buchanan. All are easily reached by improved county and state roads. Some of the minerals to be found and their locality are listed below.

Barite, found in pre-Cambrian metamorphic rocks, two miles from the northern Llano County line, between Pecan Creek and Wolf Creek.

Manganese, Spillen Mine six miles southwest of Fredonia, also near Horse Mtn.

Celestite, Little Lucy Creek, six miles northeast of the city of Lampasas.

Spiculite, occurs in Pennsylvania formation in several pits along McNett Creek, northern Burnet County.

Scheelite, amphibole asbestos, and *serpentine minerals,* found throughout the pre-Cambrian formations of northern Burnet County.

Molybdenum, bismuth, found in pegmatite dikes on Honey Creek in Llano County.

Lead, near Silver Creek in western Burnet County.

Soapstone, in gneiss, on Fredricksburg Road eight miles south of Llano.

Anthophyllite, aplite, Oxford area south of Llano.

Other minerals found in the Central Mineral Region include: *gold, silver, vermiculite, graphite, magnetite, novaculite,* and *rare earths.*

The rockhound who enjoys collecting his own material can't go wrong by visiting this region. The summer weather is comfortable and clear, ample outdoors facilities are numerous, and for those who don't care to rough it, lodging accomodations are available in either Llano or Burnet. One can meet other rockhounds here, too, as several clubs make frequent field trips to this area. Colleges send their students to study its unique geological formations. One important point to be remembered is to ask the caretaker's permission before entering on private property. A R.&M.A. membership card will usually suffice as proof of the collector's integrity and non-professional interest in collecting. This is one place where the rockhound is still welcome.

THE FINDING OF A GREAT GEM STONE

BY ALLAN BRANHAM
Lander, Wyoming

The Red Desert seemed lone and desolate. Storm clouds scudded across grey and threatening skies and it was all that we could do to keep our little tent from blowing away. We had gone to the Red Desert, in Southern Wyoming, with the idea of finding some amber of which we had heard about. As the wind roared across the desolate expanse with increasing velocity and threatened total destruction to our frail equipment, we quickly decided to pull stakes and seek the protection of the Green Mountains, where, the next morning we could hunt the more profitable green jade of Wyoming. We quickly struck camp and packed the car for the twenty mile trek through the famous Crook's Gap trail. This trail would bring us over the mountain to the east side and shield us from the fierce wind from the northwest. We made the east side in good time but too late to hunt jade. Selecting a nice spot below the timber line, and beside a large granite boulder, we made the camp for the night, and over two gasoline stoves prepared the evening meal. After the meal was over and everything was shipshape for the night, we made a huge fire of sage brush and lay beside it swapping stories of the outstanding pieces of jade that we had found during the years that we had engaged in that fascinating pastime, which had now become a commercial proposition of importance, in fact a living, with a thrill every day. As the glowing embers slowly disintegrated so did our conversation and frequent yawns signified that we were readly to hit the hay. The stars were very bright now and the storm that had threatened had passed and the morrow seemed to hold promise of a fine day. Little did we dream that it was to be an eventful day, with the dreary climbing and trudging across thousands of acres, and then as a climax, at the zero hour, the finding of the most beautiful boulder of fine jade ever found in the jade field to that time.

The morning dawned clear and fine, and after a fretful sleep we arranged a hasty breakfast, anixous to have it over with and to get started to hunt the elusive jade. There were scores of jade hunters camped on Cottonwood and in the bright morning sun we could see the camp coming to life. Smoke from the morning camp fires spiraled up lazily, the shouting of children and the barking of dogs mingled with the sounds of the starting of numerous cars getting ready to take off through the sage. With high hopes of finding at least one nice piece of jade during the whole long day, we hastily tidied up camp and set out. A canteen of water, knapsack and pick, a little lunch and here we go. Mrs. Branham generally does not go too far from the camp but really concentrates on a rather limited amount of ground, as for me, I am liable to be miles from camp within an hour after leaving.

We had purposely camped away from the Cottonwood so that we would not be followed. Now with the whole world ahead of us to hunt at our leisure, I left Mrs. Branham in and around camp and took off for the highest hill on the range, up into timber line. Carefully scanning the hill, the draws, and the open ground, I slowly covered the ground, mile after mile, up and down, up and down. Hours and hours passed, time was entirely forgotten. The sun was getting low and the sage was making shadows. Slowly I began to realize that I was far away from camp. Reluctantly I began to retrace my steps toward camp. From the top of the mountain I could barely see that Mrs. Branham had given up, and with the expectation of my early arrival to camp she was preparing the evening meal. I could see that most of the campers on Cottonwood were back in camp again. Some cars I saw were pulling out for the main highway, one could only guess what luck they have had. I, for one, was disgusted with jade hunting, and as I stumbled over the rocks and toward camp I found that I was really tired, very tired, I could hardly make it. Another fifty yards and I was on a rocky ridge that we have hunted at least fifty times. Look at that stained

granite boulder that the sun is hitting just right to make one notice it! Is it really granite? I got to my knees. Yes it was granite. I began to smell the coffee now and went on a few feet. Was that granite? I went back again and stooped down, this might be jade after all! Knocking off a little corner I held it to the fading afternoon sun. Hurrah, it's jade! It was really jade and of a beautiful color under its brown stain. Mrs. Branham at my excited call came running with her pick. Feverishly we began to pick out the outlines around the stone. We found it was very large, too large for the puny picks that we had. What to do? It's a very valuable stone and we are 70 miles from home! It was getting dark, a cold wind was beginning to blow, and here we had a most valuable piece of jade that we might lose if we left it. Now I had it figured out. To my wife, "You take the car and go home and get Lawrence Hawkins. Tell him to hire a truck, bring crowbars and some planks and a log chain. Do not come back until after mid-night so we will not awaken the campers over on Cottonwood." Within five minutes she was gone out over the hills and I and the dog were left alone. Supper had long been forgotten. Now just in case someone had heard us from the camp on Cottonwood, I carefully brushed away all evidence of any disturbance around the stone. Taking down the tent I pulled it over to the jade and erected in again right over the boulder and throwing in the bedding, the dog and I piled in on top, it was lumpy but who cared in a case of this kind. Puzzling questions raced through my mind. How did we miss that piece so many times we had hunted that ridge before? What will it weigh? Can we get it out and to the highway without arousing the camp? Finally I dozed off to sleep when I should have been outside the tent flashing a light so that when they got back they could tell where I was. There are many roads and it is very confusing after dark, and it is very easy to get lost out there. I awoke with a start as I heard some one calling "Al, Al." It seemed far away and faint. Out I scrambled with the flashlight and a hundred yards away I could make out the outlines of a truck. Did I get a roasting! Seems they had been hunting for me for a couple hours, taking this road, then that road, until they were almost ready to give up and wait until morning. Finally my wife had gotten out of the truck and started to hunt on foot when she spied a tobacco can that she had seen that afternoon and right then she knew where she was. It was only a matter of minutes after that until they found me. It was cold, it was windy and dark, and they were cross and grumpy. Now we ran the truck up so the lights would focus on the work to be done. I had the tent down in a jiffy. With crowbars we soon warmed to the task and soon had a big enough hole along side the rock to get the truck jack underneath, but she wouldn't come. On examination we found that a neck, that we did not suspect, was holding the rock solid and after we got the sod and dirt off this neck we found that it was just fine to put a chain around. We hooked the chain to the back of the truck and out she came. Oh, boy, what a boulder of jade! Now with three planks slanting from the ground to the truck we edged the magnificent boulder into the truck. Everybody was happy by now, we had won- Gathering up our gear we were soon on the road to the highway and not a soul was stirring in the camp at Cottonwood. It was our lucky day, or night I should say. We arrived home without incident about nine A.M. Every one of us were about ready to drop. A good bath, a snooze, then a hot breakfast and we were ready to examine our find. We went out in the yard with a pail of water and drenched the boulder. It was the finest piece of apple-green jade that I had seen in ten years of handling Wyoming jade. I seized the sledge hammer and struck the neck a smart blow, the neck rolled off, a clean break. This neck weighed 55 pounds and the rest of the stone 900 pounds even up. What an experience, 955 pounds of beautiful gem stone. It took us a year to find it, and we probably will never find another like it. It now reposes in the great city of Shanghai, China.

ANOTHER RARE MINERAL AT EASTON, NORTHAMPTON CO., PA.

BY J. H. BERTRAND JR.
301 No. 10th St., Easton, Penn.

Many collectors have visited the Sherrer (now Williams') quarry along the Delaware River just north of the City of Easton and are quite familiar with many of the minerals to be found there. The most abundant of these being Serpentine, Talc, Asbestos (amphibole), Eastonite and various alterations and Micas. The more fortunate collectors have been rewarded by specimens of Zircon and the rare radioactive minerals of thorium and uranium. Of the latter Thorianite, Carnotite, Gummite and Autunite have been reported.

The quarry occurs in a portion of the Pre-Cambrian Franklin Limestone (according to Peck) that has been highly altered by contact metamorphism due to an intrusive Pegmatite. The Pre-Cambrian age is confirmed by the analysis of the Thorianite by J. G. Fairchild of the U. S. Geodic Survey, and the calculations based upon the amount of derived lead present. These calculations and analyses give the mean age as 79 x 10,000,000 years.

For several years I have been visiting the quarry at frequent intervals in search of good specimens for trading and some of the thirty minerals that have been identified that I have not found as yet. The quarry was opened in 1855 and many of the minerals identified are scarce and hard to find.

On a mild day during the Christmas vacation I made a visit accompanied by my eldest daughter, Joann, who has an excellent eye for differences in rocks and minerals, for an eleven year old. On this visit we found some material that had been deposited in a crevice and different from the usual crevice material. Crevices are innumerable and usually filled with asbestos varying from solid masses to loosely adhering fibers and often adhering to the sides of the fracture crevices tenaciously. In this instance the deposit had been broken away from the sides of the crevice by the force of the blast,and could be picked up in a few pieces. The total length was about 50 cm. long and tapered in thickness and width to about 8 cm. It was crossed at intervals with masses of green mica mixed with dendrites of manganese oxides and pieces of Serpentine. Most of the space in the crevice was taken up by crystalline Calcite in which was imbedded long fibers of Asbestos at irregular intervals. It seems to me that originally the crevice was quite empty except for the Asbestos and the Calcite is a later deposit. The Calcite is permeated with very small vugs approximately 0.5 to 2 mm. in diameter and from 4 to 20 mm. long. These vugs are lined by incomplete crystals of Calcite. In the remaining space of several of them were bright yellow microscopic acicular crystals in bundles, sheafs and single crystals which often penetrated the Calcite or were entirely imbedded in it. The yellow crystals are approximately 0.02 mm. in dia. and from 1 to 3 mm. long.

I had never seen this mineral here before and started inquiries to determine if anyone had found it previously and if it had been identified if found. Wells, Fairchild & Ross in their "Thorianite Report" published in the July 1933, American Journal of Science, reported a similar appearing mineral which by chemical and optical tests was identified as Carnotite. Mr. Charles R. Toothaker, Curator of the Commercial Museum at Philadelphia, Pa., informed me that about ten years ago he found a specimen of a mineral that was in yellow acicular crystals but he did not identify it.

I endeavored to make an identification. I tried fluorescence with U.V. radiations from 200 to 400 microns. Negative results ruled out autunite. Next I determined it to be uranium mineral by Semi Micro Chemcial techniques. I also tested it for radioactivity by the Photographic method and got an excellent exposure, thru a piece of the black paper cut film is wrapped in, by a three day exposure. At this point I was at the end of my

resources so I sent samples to Mr. Samuel Gordon, Curator of Minerals at the Academy of Natural Science in Philadelphia, Pa. He advised me that an X-Ray emanination would be required and in a few days reported that such examination determined the mineral to be URANOTILE (Uranophane) Dana describes it as a hydrous silicate of U and Ca and gives the formula as $Ca0.2\ (UO_3)\ 2\text{-}(Si0_2).\ 7(H_20)$ in which the UO_3 equals about 67%. It is thought to be an alteration product of Gummite. Sp.Gr.-3.81 to 3.90 H- 2 to 3. Crystallization-orthorhombic. Soluble in HCl. Lustre-vitreous.

The Uranophane variety is described as massive with a fine fibrous structure. Localities previously reported in Dana are Germany, Australia, Mitchel Co. N. C., and Delaware Co., Pa.

Thin crusts of yellow to orange in color are numerous but the crusts are so thin and so difficult to remove from the rock that I have been unable to separate the material for testing thoroughly. Superficial tests indicate that they are not Carnotite or Autunite. Uranotile and Uranophane dissolve in HCl and the orange material does not. I am in hope of gathering enough material to make some definite identification. I have not as yet found a single specimen of either Carnotite or Autunite which passes the tests.

In reference to the Uranotile—so far as I am able to determine this is the first positively identified appearance of this mineral. The ambient conditions of the deposit are unusual and interesting but sadly to relate is the fact that I have not been able to find any more and therefore only a limited number of specimens exist at this time. I would not advise collectors to make a trip hoping to find some. I have only found it in Micromount quantities but it is excellent Micromount material.

I wish to acknowledge with thanks the helpful interest, advice, information, and assistance given to me by the following:

H. W. Black, Foreman at the quarry.
George Gehman, Discoverer of Thorianite here.
John C. Pohl Jr., Collector
Prof. Charles Cabeen of Lafayette College.
Prof. Richmond E. Myers of Muhlenberg College.
Charles R. Toothaker, Collector
Samuel Gordon and the Acadamy of Science for positive identification.

Editor's Note: According to an item in the Saturday, April 26, 1947, issue of *Easton Express,* Williams Quarry is to be abandoned in the near future because the company has reached the limit of its property rights, because it has become dangerous and expensive to operate, and because the rock now available is not of first quality.

Mr. John C. Pohl, another R&MA member of Easton, who sent us the clipping from the paper, was quoted many times in the item relative to the geology, mineralogy, and history of the famous Williams Quarry.

Garnets from New York Tunnel

Within a couple of months the boring of the New York—Brooklyn vehicular tunnel, from the Brooklyn side, should pass through the Manhattan schist rock strata under Governors Island. It it possible that another garnet-bearing area may be encountered similar to that passed through when digging from the Battery (New York) side. Entrance to the dump is at 98 Hamilton Ave., Brooklyn, and Mr. Coe is in charge.

On a brief visit to the dump on the New York side (extreme southern trip of Manhattan Island known as the Battery) made on Sat. April 19, 1947, Mr. T. Orchard Lisle found apatite (green crystal in vein of smoky quartz in mica schist) and nice blue platy cyanite in massive milky quartz.

Mt. Hekla, Iceland

Mt. Hekla, Iceland's most famous volcano, which has been dormant for many years, began to erupt again on Sat. March 29, 1947. The eruption lasted for a number of days and created considerable attention.

The worst eruption of the volcano ocurred in 1766 with great loss of life and property.

Mt. Hekla, 5,108 feet above sea level, is situated in the southern part of the island, about 20 miles from the coast.

AN OPAL OCCURRENCE IN ARIZONA

BY MRS. BERTHA E. SCHELL
Camp Wood, Arizona

I am just an ordinary prospector and do most of my own mining and at present I am developing some mining claims of my own discovery. I produce and sell quite a little gem materials. Some of them are chrysoprase, (green) sagenetic agate (very scarce and hard to get), plume agate (classed by some as sagenite), amethyst, and a lot of the more common agates and jaspers. Recently I mined out a few dendritic opals—they were found in a cavity in the opal and were very fragile and delicate—difficult to mine—but they make beautiful specimens and sell quite readily although few people know anything about them. The choice ones bring from $2.50 to $5.00 each. They are scarce and rare.

Camp Wood has had a Post office for about twenty years the mail being carried from Prescott out on a route. At present it comes three times a week from April 1st to December 1st and from December 1st to April 1st it comes only once a week because of the snow and bad roads.

I live 20 miles from my mail box and 26 miles from the Post Office at Camp Wood. The last 20 miles are terrible. My husband has a Chevrolet pick-up truck with a compound gear in it and it takes us 2 hours to make the last 20 miles either coming in or going out. From Prescott to Camp Wood or even on the next six miles to my mail box the road is fair most of the year. Some winters we are snowed in here and cannot get out because of the bad road and mud for as long as 3 or 4 months. Right here where we live the snow is not bad for we live down in a canyon that is 1380 feet deep from the top of the rim to the water level in the creek. We are forced to leave our truck on top of the rim and travel by trail the 2 miles on to our home—transporting our provisions etc. by pack burro into the camp here. We keep several burros and a saddle horse each and a few head of cattle which furnish milk, butter and beef; we also raise a dandy garden and with a pressure cooker can enough food through the summer to pass the winter.

What gem materials I sell must be transported from our mines, after packing, to the truck on burros, then hauled to the post office for mailing. Therefore, I make no special trip to get an order off unless it is an especially large one, but just mail out the orders when we go for supplies, which is usually once a month but at no special date. I usually get my mail once in 30 days so perhaps you can realize by this how much I appreciate *Rocks and Minerals* to read. I read very little but try to read up on gems and minerals as much as I can. My husband's eyes are very bad and I do most of the mining and he tends the garden and the few chickens we keep. He is 68 years of age—I am 49.

Anyone coming into my place would not believe that there are plenty of minerals here to be prospected and developed because the last 20 miles are over Malipai Mesa—nothing but volcanic rock. Then all of a sudden there is canyon cut down through the Malipai which is a capping flowed in and then on down through another layer which is volcanic ash or bentonite, then farther on down into the basalt formation which is the one that produces the gem minerals.

I know there is a lot of opal here in this canyon for it shows up plentiful about 2 miles up and down the canyon, pink, green, white, clear and black opals and opal with dendrites, etc. Some streaks of it are a foot wide then some are only ¼ inch and under and narrow here and there. Sometimes it terminates in a huge round gob of it. On the surface it is slacked pretty much but a few inches underground it hardens and clears up. I have never worked to any great depth on my claims but I'm pretty sure that if someone who knew how to mine and season it that a fortune could be made by mining it.

There are many other gem minerals to be found around here. Lots of Iceland spar, many nice jaspers, plenty of agates, geodes and thunder eggs. It is a rockhound's paradise but very hard to reach—

(Continued on page 428)

WORLD NEWS ON MINERAL OCCURRENCES

(Bureau of Mines **Mineral Trade Notes**, Feb. 20, 1947)

1. METALS

COBALT

Australia.—Estimated total output of cobalt (metal content of ores and concentrates) up to the end of 1944 is 913.65 long tons, states P. B. Nye in Summary Report 23 issued by the Department of Supply and Shipping of the Commonwealth of Australia. Between 1891 and 1910, 873 tons of cobalt ore was produced at Macquarie and Carcoar in New South Wales. From 1921 to 1934, cobalt concentrates containing 774 tons of cobalt were produced from the Cloncurry district in Queensland. A small quantity of cobalt has been produced in Tasmania and Western Australia. The only current source of cobalt and cobalt compounds is from the zinc concentrates obtained from the lead-zinc-silver ores of Broken Hill, New South Wales, which are treated by the Electrolytic Zinc Co. at Risdon, Tasmania. The known occurrences of cobalt in Australia are described below.

New South Wales.—The *Broken Hill* lead-zinc-silver ores contain cobalt partly as a constituent of lollingite and partly in cobaltiferous arsenopyrite. In 1934-36 the New South Wales Department of Mines reported that the cobalt content of zinc concentrates treated at Risdon averaged 0.0137 to 0.018 percent. More recent assays indicated a similar range. Annual production from 1938 to 1942 was approximately 18 tons of cobalt oxide containing 12 tons of cobalt.

At *Port Macquarie,* asbolite occurs in pockets in serpentine and ferruginous clays. Between 1898 and 1904, 752.8 tons of ore with an estimated cobalt content of 37.6 tons were produced.

At *Carcoar,* lenses of ore occur in a fissure partly in Silurian slates and partly in a narrow diorite dike. Between 1891 and 1895, 111 tons of ore estimated to contain 12.15 tons of cobalt were produced.

Cobaltiferous wad is found at *Bungonia,* 10 miles south of Marulan. Some mining was done in 1910 and before 1904, but no data are available as to the quantity mined.

In the Bismuth mine at *Torrington,* 12 to 15 miles northeast of Emmaville, cobalt occurs in small quantities in the wolfram-bismuth deposits.

Cobalt minerals have been reported from 20 other localities in New South Wales, but the occurrences are mainly of mineralogical interest and there has been no production.

Queensland. The principal source of cobalt in Queensland has been the *Mount Cobalt mine,* 18 miles by road south of Selwyn. The mine produced hand-picked ore and concentrates containing 766 tons of cobalt between 1921 and 1934 and has been the largest producer in Australia. Although tests being made of sands from the dump by the Melbourne University Ore-Dressing Laboratory are not complete, it reports "that there appears to be no reasonable prospect of carrying out any satisfactory treatment on the dump material."

The *Success* mine near Longara Siding, 19.5 miles south of Cloncurry, was essentially a copper lode, the principal minerals being bornite and chalcopyrite with some cobaltite. Between 1929 and 1931, 24.85 tons of ore containing 5.47 tons of cobalt were produced.

At the *Queen Sally* mine, 6 miles southeast of Kajabbi railway station, 60 miles northwest of Cloncurry two pipelike ore shoots were tested by shafts. The oxidized ore contains black oxide of cobalt and some erythrite. Oxidized ore averages about 10 percent, and selected sulfide ore about 8 percent cobalt.

The cobaltiferous material found in the Dugold River and Coocerina zones in the *Narraku* area, 36 miles northwest of Cloncurry, is low-grade, but the zones are large, and testing would be necessary to determine their economic importance.

Other deposits in the Cloncurry district are the *Pinkie* and *Centipede* lodes in the Kajabbi area; the *Volga, Black Jack,* and *Scanlon's* lodes in the Narraku area; and five in the Soldiers Cap area. Only traces of cobalt are found in the zinc-lead-

silver and the copper ores in the Mount Isa mines. Small quantities of cobalt minerals have been reported from a few other localities in the Cloncurry district.

Asbolite and cobaltiferous wad are found on Mount Cobalt near Mount Coora, 8 miles south of *Kilkivan* in southeastern Queensland. Considerable prospecting was done in the area, but only 10 tons of samples were produced in or before 1901 and 4 tons of 4-percent ore in 1903.

In the Chillagoe district, cobaltite occurs in the Cambourne copper lode in the Red Cap area. In 1923-24 about 100 tons of ore was broken from a lode in the Red Cap area by the Commonwealth Cobalt Mines, but the ore was too low-grade and the lode too narrow for exploitation.

Cobalt minerals have been reported from several other districts in Queensland, but they are of mineralogical interest only.

Victoria.—Small quantities of cobaltiferous wad have been reported, but no deposits of economic importance have been found.

Tasmania.—At *Mount Remus,* about 15 miles south-southwest of Moina, cobaltiferous pyrite occurs in a narrow lode in association with pyrite, molybdenite, quartz, and a vanadium-bearing chlorite. The cobalt content averages 0.2 to 0.3 percent.

In 1938, the Electrolytic Zinc Co. produced 0.6 ton of cobalt oxide containing 0.387 ton of cobalt from zinc concentrates from the Read-Rosebery mines. There was no reported production from 1939 to 1942, but 0.44 ton of cobalt metal was recorded in 1943 and 0.25 in 1944. The cobalt content of the zinc- lead-silver ores is apparently small.

South Australia.—Cobalt minerals have been reported 8 miles north of *Bimbourie* and at *Ethiudna Hill* in the Olary districts; *Mount Ogilvie,* and *Nichol's Nob,* 23 and 25 miles northeast of Copley, *Young's* cobalt mine and *Flinders Range* mine at Blinman; *Cartaps Creek,* 13 miles north of Burra; and *Murninnie,* 22 miles southwest of Whyalla. There has been no recorded production of cobalt from South Australia.

Western Australia.— Two tons of ore are reported to have been produced in Western Australia in 1902, but the locality is not known. Cobalt minerals occur at many places, but, except possibly in the Ravensthorpe district, where three small shoots of cobalt ore are reported, there are no deposits of commercial importance.

COPPER

China.—Ma Yun-piao, of the North Yunnan Mining Products Bureau, in an address given to the Yunnan Civilian Industrial and Mining Association, stated that the copper mine at Tungchuen has occupied a prominent position in the mining history of China. During the past 198 years, 700,000 to 900,000 metric tons of copper has been obtained from this mine. According to expert investigations, the mine still contains a potential reserve of about 1 million tons, which is 60 percent of China's copper reserves. At the end of the war, copper mining ceased, and tens of thousands of miners were out of work. In order to alleviate the situation, the Mining Products Bureau in North Yunnan asked for a 50 million dollar loan from the China National Resources Commission, and leased the mines to local people. Up to the end of November 1945, no copper had been sold and the loan was exhausted. CNRRA instructed the copper-refining factory of the Kunming Branch of the Central Machine Works to resume work in order to buy the mining products and facilitate the mining enterprise. (Vice Consul Stanley A. McGeary, Kunming.)

IRON ORE

Newfoundland (Labrador). — Only scant information on the results of last summer's exploration survey of the Ungava iron deposits in Labrador are available, but it is understood that drilling revealed mineral wealth exceeding expectations, not only of iron ore but also other minerals. The forthcoming annual report of the company is understood to reveal that the iron ore bodies were found to be wider than expected, with grade (average 61 percent) and other characteristics continuing to be a satisfactory. At the beginning of the season, 1,288,900 tons per vertical foot was indicated by the surface

exposures. The Hollinger company has applied to the Quebec and Newfoundland Governments for a railway charter and rights of way along the proposed route 300 miles long, from a point on the Gulf of the St. Lawrence in the Moisis-Mingan area to the east of Seven Islands township.
(Third Secretary of Embassy Paul F. DuVivier, Ottawa.)

Poland.—During the first 10 months of 1946, 351,156 metric tons of iron ore were produced in Poland as follows:

	Metric tons
Clay ironstone	249,706
Limonite	32,366
Bog iron	28,334
Pyrite	23,004
Magnetite	17,746
	351,156

In October, 18 mines were operating—5 in Konopiska, 6 in the Borek, 6 in the Staropolski district, and 1 in Lower Silesia. Employment at the mines at the end of October totaled 6,418—386 office employees and 6,032 workers.
(Senior Economic Analyst Ludwik Sztolcman, Warsaw.)

II. INDUSTRIAL MINERALS

PHOSPHATES

Australia.—Small deposits of phosphate rock, guano, cave earth, and similar occurrences are found in all the mainland States but are of little commercial importance. South Australia possesses the largest deposits of phosphate rock in the Commonwealth, but the rock is low in phosphate content and contains the undesirable impurities iron oxide and alumina in quantities far exceeding the permissible maximum for superphosphate production. Even if the grade were suitable for the preparation of superphosphate, the deposits could not supply more than a fraction of Australian requirements. Imports of rock in a normal year (1938-39) were 800,421 long tons. Tasmania has no deposits of phosphate rock, although small quantities of guano were removed from coastal islands in the past. No workable deposits of phosphate rock are known in Northern Territory or Papua, but small deposits occur on some of the islands of the Territory of New Guinea.

During the last century, phosphate rock and guano were exported from Western Australia. The recorded production from 1876 to 1902 was 112,749 tons. Production ceased in 1914. In 1940, the shortage of phosphate stimulated output of small quantities, and from December 1943 to December 1945 phosphate rock and alluvial material suitable for superphosphate manufacture were produced on Pelsart Island. Of all the phosphate-rock deposits worked in Australia in recent years, this contains the highest-grade material.

In South Australia, production commenced in 1903 and continued steadily until 1922. After 1922, local production declined, and from 1922 to 1941 output of phosphate rock in the State was small and intermittent. The wartime shortage also stimulated output here, and 13,958 tons were produced in 1942, the peak year. Most of it came from the Hundred of Belvidere. Since then, production has declined.

The Mansfield deposits in Victoria were worked from 1916 to 1926, yielding 16,014 tons of calcium and aluminum phosphates. The material was treated under patented processes, but product was not effective as superphosphate. The deposit has not been worked since 1926.

In New South Wales, phosphate rock has been worked on a small scale in five districts. The recorded output from 1914 to 1944 was 9,810 tons.

The deposit on Holbourne Island, off the Queensland coast, was worked from 1918 to 1922, but the low grade of the rock prevented further production.

Output of Australia rock declined when the importation of high-grade phosphate rock from Nauru commenced shortly before the war of 1914-1918. During the two wars, shortages of phosphates led to thorough investigations of local deposits and a subsequent increase in local production.

As imports increased after 1943, production of local phosphate rock declined and by the middle of 1946 had just about

ceased. Future production is expected to be negligible, as there is little likelihood of phosphate rock from local deposits competing with imports of high-grade rock under normal conditions.

Phosphate rock is not exported from Australia. Small quantities of superphosphate are exported, mainly to Fiji; the remainder of the exports go to other Pacific Islands and New Zealand. The quantity exported, small in prewar years, became negligible because of the wartime shortage. Almost all of the superphosphate exported was shipped from New South Wales.

Deposits in the various States are described briefly in the following section.

Queensland.—The only recorded output of phosphate rock from this State is from Holbourne Island, about 20 miles northeast of Bowen, on the east coast. The phosphate rock, formed by the alteration of coral, extends over an area of 5 acres and has an average thickness of 5 feet, with overburden up to 10 feet in thickness. Present reserves are about 30,000 to 40,000 tons containing 43.6 percent tricalcium phosphate, according to J. H. Reid in 1944 (Holbourne Island Phosphate Deposits; Queensland Government Mining Journal, 45 (512), p. 153). The material is unsuitable for superphosphate manufacture because of the high content of calcium carbonate and the low grade. Guano has been worked at Olsen's and Johansen's Caves in the Rockhampton district, according to B. Dunstan in 1913 (Queensland Mineral Index and Guide. Geological Survey Queensland, Pub. No. 241, p. 821).

New South Wales.—According to H. G. Raggatt in 1928 (Geological Survey, N.S.W., Phosphates Mineral Industry of New South Wales, p. 364), phosphate rock occurs at Canowindra, Kempsey, and in the Molong district. Guano, bone breccia, cave earth, and other similar minerals occur in the caves at Wellington and Ashford. In the earlier days of phosphate production in this State, phosphate rock was used chiefly as a flux in steel manufacture, although a small quantity was used for fertilizer.

Victoria.—Phosphates of calcium and aluminum have been recorded from many places, but production was restricted to deposits at Phosphate Hill in the Mansfield district, 131 miles northeast of Melbourne by rail. Phosphate Hill is 3 miles west of the town. The rocks are chert and slate with phosphatic beds, which are crumpled and folded and strike east and west.

Tasmania.—No phosphate deposits of commercial importance have been recorded. Small deposits of guano have been formed on islands off the coast of this State, but, owing to the absence of limestone on the islands, no phosphate deposits have been formed. According to W. H. Twelvetrees, in 1917 (Phosphate Deposits in Tasmania; Geol. Surv. Tas. Min. Res. No. 3) guano was recorded from the following islands: White Rock Island, a granite island off the east coast; Garden Island, a dolerite island in Norfolk Bay; Slopen Island, in Frederick Bay, which is composed of Permo-Carboniferous sediments; and Sea Elephant Rocks, also known as Councellor Island, a granite island off the east coast of King Island. On some islands, phosphate rock has been formed on a small scale by reaction of phosphates from guano with sea shells and the feldspars. Such occurrences are too small to be of economic importance.

South Australia.—Many small deposits of phosphate rock have been worked intermittenly. St. John's deposit in Kapunda district is 4.3 miles southeast of Kapunda, which is 48 miles north-northeast of Adelaide by rail. It is a replacement of a very fine-grained sandstone or sandy shale by calcium phosphate and is associated with marble and aluminum phosphate. The rock is composed of soft phosphatic material with nodules of phosphate. The deposit was worked before 1919. The grade of the rock obtained from 1919 to 1922 was 45 to 48 percent, expressed as tricalcium phosphate. In 1943, the reserves were estimated at 76,000 tons containing 45 percent tricalcium phosphate, according to S. B. Dickenson and E. Broadhurst in 1943 (S. Aust. Min.

Rev. No. 78). The deposit was worked by the British Phosphate Commissioner from early in 1943 to March 1944, during which time 4,349 tons were produced. When work ceased, 929 tons had been ground and used in a mixture containing equal proportions of rock and superphosphate. The remainder was stacked at Adelaide.

The Hundred of Belvidere has several deposits, which have supplied most of the wartime output in this State. Material from Tom's deposit on St. Kitts Creek, 6 miles east-southeast of Kapunda, is too impure for superphosphate but is suitable for the blast-furance charges of the Broken Hill Pty. Co., Ltd., which has worked a quarry here since 1941. The St. Kitts deposit in this same Hundred, 5 miles northwest of Truro, 58 miles northeast of Adelaide by rail, is calcium phosphate in slate and is unusual, in that it is not associated with limestone. Work ceased there in 1919. Recent investigation by the Department of Mines disclosed that the material is low-grade and the deposit is small. The only production in recent years has been small tonnages of good-quality rock obtained by hand picking for superphosphate manufacture. The Koonga deposits, 5 miles southeast from Kapunda, have yielded little since 1919, and the deposits are almost exhausted.

Many phosphate-rock deposits in the Hundred of Moorooroo have been worked on a small scale but are now closed. Other Hundreds containing deposits are Para Wirra, Walloway, Clinton, Myponga, Tarcowie, Willunga, Noarlunga, and Bright.

In the past, guano has been obtained from Marum Island, Bickers Island, and other islands.

Apatite deposits occur in the State, and many attempts have been made to work them. Parcels from Olary were tested recently, but the grade and the high silica and fluorine content render the material unsuitable for use.

Western Australia.—During the last century, deposits of guano and phosphate rock on many of the islands off the coast were worked extensively. The material was exported at first, but after 1904 exportation was prohibited and the product was used locally. Official records of production before 1904 are incomplete, as it is known that figures were not always supplied by the producers. The figures indicate that the Albrolhos Group, Lacepede Islands, and Browse Island were the largest producers. At present, the islands in the Albrolhos Group only are important. The recorded production of guano and phosphate rock from 1876 to 1904 was 118,265 tons, and from 1905 to 1915, 13,997 tons. In these records, bird droppings were regarded as "live" guano as opposed to "dead" guano, the term for phosphate rock.

The chief deposit of phosphate rock worked in the State in recent years is on Pelsart Island, one of the Albrolhos Group of low-lying coral islands and reefs. The deposits were first worked in 1878, but there is little information regarding early production. The deposit was worked again from December 1943 to December 1945, during which time 12,454 tons of phosphate rock and phosphatic alluvial material were mined and shipped to Geraldson, where, at the works of Cuming Smith and Mt. Lyell Farmers Fertilizers, Ltd., it was mixed with imported phosphate rock and converted into superphosphate.

The Dandaragan deposits are 20 miles by road west of Moora, a town 108 miles by rail from Perth. Outcrops of two beds, each 2 feet thick, are found over an area 24 miles long by 4 miles wide. The age of the bed is Cretaceous. The lower phosphate bed is underlain with ferruginous sandstone and lies beneath glauconitic greensand. It consists of phosphate nodules and fragments of wood replaced by apatite in a matrix of greensand. With a 20-foot stripping limit, the bed would yield about 691,000 tons containing 13 percent tricalcium phosphate. The phosphate is not amenable to beneficiation.

The upper phosphate bed is overlain by chalk and underlain by glauconitic greensand. It contains nodules similar to those in the lower bed in a glauconitic chalk. Concentration would not yield a

product suitable for superphosphate manufacture. Assuming a 20-foot stripping limit, the bed would yield about 263,000 tons containing 23.9 percent tricalcium phosphate. The deposits cannot be worked economically under present conditions because of low grade impurities, thickness of overburden, distance from a market, and other factors.

In places in the coastal limestone hills between Perth and Geraldton there are cave deposits of guano with the remains of bats, birds, and other animals. The guano, which varies in quality, occurs as a thin covering only, and the deposits are too small to be of value.

Northern Territory.—No workable deposits of guano, phosphate rock or apatite have been recorded. A deposit containing apatite, at Alcoota Station. 90 miles by road southeast of Alice Springs, was investigated by officers of the Mineral Resources Survey. Apatite associatd with magnetite occurs at the contact of limestone with pegmatite, but the reserves are negligible.

Mandated Territory of New Guinea.—According to R. C. Hutchinson, in 1941 (Phosphate Deposits in New Guinea; New Guinea Agricultural Gazette 7 (4), p. 239) deposits of phosphate rock, estimated to contain at least 80,000 tons occur on the islands of Wumulu, Aua, and Manu. These islands are about 285 miles west of Lorengau on Manus Island, in the Admiralty Group. On the Purdy Islands, about 95 miles southwest of Lorengau, are deposits estimated to contain 27,000 tons of phosphate rock with 21.8 to 25.7 percent tricalcium phosphate. Bat guano occurs in caves in many parts of New Guinea. The Kaut Caves on the western side of New Ireland were estimatd to contain 5,000 to 10,000 tons of guano. Both the phosphate rock and the guano could be used only for fertilizer for direct application to the soil to meet local requirements, as the deposits are small and the grade low.

Before World War II, almost all of the Australian requirements of phosphate rock were obtained from the high-grade deposits on Nauru and Ocean Islands, which are worked by the British Phosphate Commission in behalf of Great Britain, Australia, and New Zealand. In 1937-38, Australia imported 777,595 tons of phosphate rock from these islands. The reserves of phosphate rock on Nauru and Ocean Islands were estimated to be 277,785,000 tons in 1944 (F. C. Noyes, Phosphate Rock Industry of Foreign Countries: Mining & Metallurgy, vol. 25, No. 454, 1944), and, as the production was about 1,300,000 tons in 1939, it will be many years before these deposits are exhausted. When these supplies were cut off by the war (at the end of 1941), supplies were maintained by rationing crude rock, drawing on stock piles that had been built up by the British Phosphate Commission, and by importing smaller quantities of phosphate rock from more distant sources. This caused the price of superphosphate to increase greatly.

The wartime shortage of phosphate rock was responsible for a thorough investigation of Australian deposits, especially those in Western Australia and South Australia, which had yielded the material in the past; but subsequent production supplied a very small part of Australian requirements. As much of the phosphate rock from South Australia (from which district most of the rock was mined in this period) was unsuitable for superphosphate manufacture, attempts were made to market it mixed with an equal weight of superphosphate, but demand for this mixture was small.

During the last 40 years no major deposits of phosphate rock have been discovered in Australia despite thorough investigations, especially during the years of the two world wars. Consequently, there seems small chance that large deposits will be found, and Australia will continue to be almost entirely dependent on imports for supplies.

Therefore, in normal times all Australia's supplies of phosphate rock are imported. Imports were steadily increasing before the war and reached a peak of 800,422 tons in the year ended June 30, 1939. Since then imports have been reduced severely. The lowest annual im-

ports of recent years were 225,178 tons in the fiscal year 1943, but the quantities imported since have increased, and when normal supplies are available again they will probably exceed the 1939 figure.

SPODUMENE

Canada.—Interest in the lithium-bearing deposits in Manitoba revived in 1946, during which time considerable publicity was given in the press. The existence of spodumene was known as early as 1924, when the deposit at the Bear claim near Lamprey Falls, on the Winnipeg River, was discovered. In the 2 years that followed, deposits of spodumene were discovered at Bernic and Cat Lakes, reserves of the latter being said to include at least 5,000,000 tons of lithium-bearing material, and, in smaller quantities, at other points near the Bear claim. In 1931, a notable occurrence of spodumene was discovered in the Herb Lake area.

Considerable interest in the deposits was aroused in mining circles at the time of their discovery, but it soon subsided when it was realized that the dfficulties of commercialization outweighed the advantages. Nevertheless, since that time sporadic attempts have been made to develop the claims. The deposits at the Bear Lake claim were taken over by the Silver Leaf Mining Syndicate (Canada), Ltd., and considerable development work was done. Nine spodumene occurrences in an area 500 feet wide and 3,000 feet long near the east end of Bernic Lake were explored; also, preparatory work was done at the Annie, Gray, and Captain claims, all within a few miles of the Bear Lake claim. In addition, Sherritt Gordon Mines, Ltd., in 1942 undertook diamond-drilling in the Herb Lake vicinity, which disclosed an average spodumene- content of 13.76 percent over an average horizontal width of 18.6 feet for a length of at least 900 feet, with confirmation of continuity to depth, the lithia content of this occurrence reportedly ranging from 6 to 7 percent. However, the company later announced that it considered the deposits too remote for profitable development under the conditions at that time.

The recent revival of active interest in the development of these resources is attributed by the press to the many uses for lithium discovered during the war. Attention is called also to the fact that most of the spodumene deposits are localized in an area where hydroelectric power is available, which undoubtedly would be of first importance in any prospective development of the deposit.

(Vice Consul Allen L. Dewey, Winnipeg,)

W. H. BROADWELL

(Obituary Notice)

William H. Broadwell, 70 retired printer, minerologist and photographer, who had taken many historical pictures of Newark and scenes of the Revolution in New Jersey, died at City Hospital Wed., April 2, 1947 of a cerebral hemorrhage. He was taken to the hospital Tuesday night when police found him unconscious on the floor of his shop at 68 Garside street, Newark, N. J.

A native Newarker, descendant of Rev. Jacob Greene, one of the first trustees of the College of New Jersey, which became Princeton University, Mr. Broadwell was a familiar figure on Newark streets due to his manner of dress. He never succumbed to urban style and always wore a goatee and broadbrimmed Western hat, corduroy coat, riding breeches and high laced boots.

For half a century Mr. Broadwell roamed the state, taking pictures of landmarks and scenes of historical interest. Numerous of his photographs were exhibited at Newark Public Library.

Other Hobbies

Other pursuits engaged in by Mr. Broadwell included the collection of newspaper and magazine clippings referring to state events, the collection of theater programs, entomology and mineralogy. He was a member of the New York Mineralogical Club and the Mineralogical Society of America, and in 1915 was an organizer of the Newark Mineralogcal Society, of which he served as secretary 13 years.

Police discovered Mr. Broadwell when Frank Gesualdo, superintendent of the building, reported he had not been seen for three days. He moved to the shop and small apartment in the rear five months ago.

Newark Evening News
April 3, 1947

Editor's Note: We are indebted to Albert S. White, of Newark, N. J., for the above item which he clipped from the Newark newspaper. Mr. Broadwell, who was well known to collectors of the New York area, was a most active collector and was frequently seen on field trips.

ABSTRACTS OF THE FIRST 20 MEETINGS OF THE NEW YORK MINERALOGICAL CLUB

By E. LAWRENCE SAMPTER

On Sept. 21, 1946, the New York Mineralogical Club celebrated its 60th Anniversary—it is the oldest mineral society in the country. Below is a brief abstract of the first 20 meetings as taken from *The Exchangers' Monthly* (published by Thos. Chamberlain Jr., in Jersey City, N. J., from Nov. 1885 to Oct. 1890).

The first two meetings received the following notice which is reprinted completely:

Mineralogical Club of the New York Academy of Science

In answer to a call from Mr. George F. Kunz, Prof. D. S. Martin, and Mr. B. B. Chamberlain, a number of mineralogists gathered at the house of Prof. D. S. Martin, on Sept. 21st, to form a Mineralogical Club for the purpose of increasing the interest in this science, mutual benefit and more especially to form a cabinet of New York County minerals before the improvements now going on in said county made it impossible to form such a cabinet. This cabinet will be presented to some museum or public institution when it arrives at such a state as to warrant the transfer. A temporary organization was formed by electing Prof. Martin as Chairman and Mr. Kunz as Secretary, and the appointment of a committee of three to draft a constitution and by-laws, consisting of Mr. Kunz, Prof. Martin, and Mr. Chamberlain. Mr. Kunz announced 35 names on the roll of membership, and after a number of remarks on the subject and an examination of Prof. Martin's cabinet the meeting adjourned.

The second meeting was held at the rooms of Mr. B. B. Chamberlain, on Oct. 28th, and proved a very interesting one. Mr. Chamberlain's collection of New York City and Bergen Hill minerals is noted as one of the finest in the country and we found it all that had been said about it. After an examination of his cabinet the meeting was called to order with Mr. Chamberlain in the chair and Mr. Kunz as secretary. Prof. Martin read the Constitution and By-Laws of the Club, which the committee had prepared, but as there was considerable discussion over some of the articles, their adoption was laid over to the next meeting. Rev. J. Seldon Spencer, of Tarrytown, N. Y., who was present, gave us an interesting account of a similar club in Philadelphia, after which Dr. A. C. Hamlin, one of the officers of the Mount Mica Mining Co., gave us an interesting account of the occurrence and working of this celebrated tourmaline locality and exhibited the largest transparent crystal ever taken from the mine, it being ten and a half inches long and two inches in diameter. He also exhibited a case of cut gems from these tourmalines in various shades of green, blue, rose, yellow, and white, which proved the wonderful resources of these celebrated mines. After the meeting Mr. Nourse, an artist, invited the members to view his paintings, while Mrs. Nourse treated them to refreshments, both of which were enjoyed. Among those present were Clarence A. Bement, of Philadelphia; W. A. Roebling, H. L. Fairchild, W. R. Niven, Loyal M. Ives, B. G. Amende, of New York; and A. Chamberlain, of Jersey City.

All Mineralogists wishing to join this club should send their applications for membership to either Mr. George F. Kunz, at Tiffany's, New York City; Mr. B. B. Chamberlain, 247 W. 125th St., New York City; or Prof. D. S. Martin, 236 W. 4th St., New York City.

All lovers of this science are invited to send in their applications.

The Exchangers' Monthly
Dec. 1886, p. 16

3rd Meeting—Nov. 30th, 1886

Held at Rutger's Female College, 58 W. 55th St.

Prof. D. S. Martin presided. Mr. Kunz was secretary. Committee appointed to draw up constitution:-Mr. Kunz, Prof. Martin, B. B. Chamberlain, W. A. Roebling, and Rev. R. T. Attlebury.

Mr. Chamberlain reported on his catalog of N.Y.C. minerals of 55 species and 110 varieties.

Mr. Wm Niven presented the 1st specimen for the club's collection—a slab of gneiss with 3 groups of radiated tourmaline.

Prof. Martin arranged to inspect his collection of pseudomorphs and the geode collection made by Catlin, the Indian writer etc., from upper Missouri.

4th Meeting—Dec. 28th, 1886

Held at res. of J. B. Amend—120 E. 19th St.

Mr. Bjerreguard exhibited green and blue tourmalines from N.Y.C.

Mr. Kunz exhibited meteorites from Kentucky.

Mr. Chamberlain exhibited moonstone and dolomite from Tarrytown, N. Y.

Mr. Hidden exhibited a 12 lb. meteorite from North Carolina and also hiddenite.

5th Meeting—Feb. 1, 1887

Held at res. of Rev. A. P. Atterbury—117 W. 87th. St.

Kunz exhibited meteorites from Arkansas and Brazil.

Hidden exhibited emeralds from North Carolina.

Niven exhibited chalcopyrite from Pennsylvania.

Chamberlain exhibited N.Y.C. minerals.

6th Meeting

Held at res. of D. S. Martin and lecture by him on rocks and minerals of N.Y.C.

Kunz exhibited nyrophane (called magic stone) and rhodochrosite from Colorado and mica from 4th Ave. & 65th St., N.Y.C.

Hidden exhibited rutile from North Carolina, meteorites and quartz from N. Y.C. and indicolite from 4th Ave. & 104th St. (must have been before 4th Ave. was changed to Park Ave.)

7th Meeting—Mar. 29th, 1887, at res. of W. H. J. Sieberg.

Name "New York Mineralogical Club" adopted.

Kunz exhibited amethysts from Deer Hill, Maine, and monazite from Brazil.

Hidden exhibited meteorites from India and England, hanksite from Nevada and xenotime from and North Carolina.

Byerreguard exhibited pyrite from Croton aqueduct shaft and feldspar from 100th St. and tremolite from Spuyten Duyvil.

Niven exhibited apophyllite and analcite from Erie tunnel, Bergen Hill, N. J.

Chamberlain exhibited stilbite from 4th Ave. & 95th St. and Bergen Hill and Tarrytown, N. Y.

Sieberg exhibited pyroxene from Inwood and mica from 90th St. and River Side Drive.

Braun exhibited quartz and gold from California.

Chamberlain exhibited prehnite from Tillie Foster.

16 members present.

8th Meeting—at J. B. Amend's—officers elected

G. F. Kunz, sect.

B. B. Chamberlin, Treas.

Executive committee—D. S. Martin, Rev. J. S. Spencer, E. A. Hutchins and G. F. Kunz.

Curators—R. P. Whitfield and L. P. Gratacap.

Read and adopted the constitution, which is reprinted in this article complete.

Kunz exhibited gold and quartz from California and topaz from Siberia.

Hutchins exhibited corundum from North Carolina.

Rosch exhibited orthoclase from Rye, N. Y. and laumontite from Tillie Foster.

Dr. Hunt exhibited agate.

Woodman presented the club with very small garnets from N.Y.C.

9th Meeting—May 30th, 1887

At res. of Rev. J. S. Spencer in Tarrytown, N. Y., where members inspected his collection—church—and the town sights.

10th Meeting—June 28th, 1887

At res. of B. B. Chamberland, 247 W. 125th St. where members inspected his collection.

11th Meeting—July 23rd

At Fort George, N.Y.C., but it rained and only 3 came.

A special meeting was held at Martin's, 236 W. 4th St., on July 28th. Kunz told of his trip to Kentucky.

(This probably accounts for the mix-up later when two 18th meetings are reported on different dates).

12th Meeting

At Peekskill Military Academy (Peekskill, N. Y.) by invitation of Pr. J. N. Tilden—head of the Academy—who showed his collection.

13th Meeting—Sept. 27th, 1887—at N. Y. Univ. on Wash. Sq.

Prof. Stevenson exhibited crude petroleum and discussed oil wells in the United States and Russia and natural gas in Pittsburgh, Pa.

Chamberlain, Hutchins, Spencer, Niven, and Kunz were elected a committee to pass on future papers to be read.

14th Meeting—Oct. 25th, 1887—at Natural History, Hall of College of N.Y.C., 23rd St. & Lexington Ave.

Rev. Spencer chairman—26 members present.

Subject paper by Mr. Braun on Quartz.

Kunz exhibited beryl, epidote, columbite from N.Y.C. and talked about quartz.

15th Meeting—Nov. 29th, 1888

Held at res. of Miss F. R. M. Hitchcock—41 West 73rd St.

Miss Hitchcock was chairman—Kunz sect.

25 members present.

Subject—gold and talk by Mr. Watts, Rev. Spencer and Prof. Martin.

16th Meeting—Dec. 27, 1887

At Rutger's Female College—54 W. 56

Prof. Martin chairman—Kunz sect.—20 present.

Subject silver and talks by Dr. Hunt of Montreal.

17th Meeting—Jan. 31st. 1888, at Prof. Martin's

Prof. Martin, chairman—E. Schernikow, sect.—Kunz absent.

Subject—native copper. 20 members present.

18th Meeting—Feb. 28th, 1888, at Univ. C. of N. Y.

Supposed to have been held at Columbia University but the elecrtic lights were not working.

Prof. Sanderson, chairman—Kunz sect.—22 present.

Prof. A. A. Julien gave a 2 hr. lecture on micro slides and showed 75 slides on a screen by oxy-hydrogen stereoptican.

18th Meeting (another 18th reported in issue of June, 1888, vol. 3 No. 8).—April 24th, at res. Arthur Chamberlain, Jersey City, N. J.

Chamberlain chairman, Kunz sect.—18 present.

Announced Kunz president and Caswell sect. of the Academy of Science Mineral Section.

Discussed raising money for purchase of Chamberlin collection for club and appointed committee.

19th Meeting (Should have read 20th)—June 8th, 1888, at res. of B. J. Amend, 120 E. 19th St.

Amend chairman — Kunz sect.—20 present.

Comm. appointed to pack and remove B. B. Chamberlin's collection to the Museum of Natural History and to pay the expenses.

Dr. Arnold elected curator of the club.

(No more meetings reported in the Exchangers' Monthly)

Opal Occurrence in Arizona

(Continued from page 418)

75 miles by road from Prescott and not a single place to buy even a loaf of bread nor is there a gasoline station along the way as the area is very sparsely settled.

Editor's Note: Camp Wood is in the western part of Yavapai County, of western Arizona. Mrs. Schell's home is 26 miles northwest of Camp Wood which in turn is 32 miles northwest of Prescott.

GORDON ON DESERT MINERALS

BY CHARLES A. BELZ, SECRETARY
Philadelphia Mineralogical Society

Contemplation of a mineral deposit, or a geological formation is very much like viewing a railroad train at a way station. They are both, at that particular moment the materialization of a phase in continuing chains of events that had their beginning somewhere in the past, and are proceeding according to their nature, to some ultimate destiny.

By such apt analogies, Samuel G. Gordon, eloquent in the art of illustration, developed his discourse on "Desert Minerals" before the Philadelphia Mineralogical Society. The subject matter was taken from his own desert explorations and researches in these magnificent laboratories of Nature where at first hand he could study the work of that venerable scientist, Father Time, acting in concert with the raw forces of creation and destruction.

The study of the occurrences and formation of minerals has always been an absorbing one to Science, and the proof of theories, some of them admittedly the offspring of such libertines as Conjecture and Logic, is eagerly sought in every fragment of evidence wherever it may be discovered. Anomalous as it may seem, no more fertile ground can be found for such endeavors than in Desert topography.

Mr. Gordon explained by way of introduction, that most alteration occurs in the zone of oxidation—that portion of the earth's mantle that lies between the surface and the zone of water saturation. The upper surface of the zone of saturation, the "Water Table," in such terrain as we have locally, may be only a few feet below the surface, but in the desert regions, it may be down as far as a thousand or more feet. In these mammoth beakers can be found substantial evidence of mineral alteration—here can be read, with little need for symbolism, the chemical equations of evolution from the one form to the other. Here, the G-men of Science may diligently ferret out their evidence. By way of example, Mr. Gordon cited the oxidation of Galena (PbS) to Anglesite ($PbSO_4$) where proof of such change is found in nodules with a core of unaltered Galena and concentric banding of Anglesite. Subsequent action of carbonated waters demonstrate the carbonation of Anglesite to Cerussite ($PbCO_3$).

A similar chemical equation in situ is written in mile deep salt domes, the upper gypsum ($CaSO_4$) beds of which, hundreds of feet thick, showing cappings of Calcite ($CaCO_3$)—mute evidence of contact with carbonated percolating water.

In comparison with the North American desert, the Atacama desert in Chile gives a more complete picture, obviously due to the almost complete absence of rainfall there. In the American desert, the comparatively more abundant rainfall is just sufficient to carry away in solution, the more readily soluble minerals of the transition stages. These intermediate equations are in that sense, erased. For example, the alteration of Pyrite, Iron Sulfide, (FeS_2) to Limonite ($Fe_2O_3HO_2$) is an extremely important one and presumably one that progresses in easy stages. However, in some deposits where all intermediate stages are absent, it is an interesting subject of speculation as to whether the intermediate stages *were* formed, and the evidence carried away in solution, or whether the oxidation went forward at express speed with no local stops.

Mr. Gordon described the mineral deposits of Chuquicamata in the Atacama Desert, Chile. Copper salts are present to the extent of 1½% and it is estimated that this huge deposit, with a record approximating 100,000 tons of ore daily, contains copper enough for centuries. As for the American Desert deposits, the Mammoth Mine near Tucson, Arizona, with a zone of oxidation nearly 700 feet deep—the source of so many superb specimens of Copper, Zinc and Lead minerals, is by far the most famous among mineral collectors with their characteristic disdain for its economic importance. Mr. Gordon

only too briefly reviewed his work at this mine, described the relative position of the Mammoth and the Collins veins, a circumstance which gave rise to the theory that they are actually the one a continuation of the other, subjected to lateral displacement by faulting. These veins are in Copper, Zinc, Lead, Vanadium, and Molybdenum minerals, and contain gold and the deposit is unique in the profligate occurence of exquisite combinations of Dioptase, Willemite, and Wulfenite crystals.

Leadhillite and diaboleite occurred rarely in vugs, where they were formed by alteration of galena, thru sulfate and carbonate stages, by percolating ground waters. The former has been the subject of exhaustive study by Mr. Gordon, and he showed drawings of formidable looking crystals discovered at that mine. Mr. Gordon compared the copper deposits at Sombrero, Butte, Bisbee, and at Bingham Canyon.

ONCE, GONE FOREVER

BY QUO LAPIS

Once we were the life of the party. We went to many, arriving at the correct time, and staying late enough to help the hostess stack the dishes or to meet the milkman. Once my hands looked like lotion ads. Now they look like the horrible example of before using. On Sundays we dressed in the height of fashion and were seen with the elite. Then it happened. We became Rockhounds!

Now our lives are changed. No one invites us to parties, save in the dead of Winter. "What's the use," they say, for we leave before things get going. A field trip is deadly on little sleep and a fuzzy feeling. And at parties they never mention Dana or Dake.

I gaze at a picture of us taken on a Sunday in May. I wore a chic bonnet and a fragile coat. My husband was shaven and starched. We were standing on the steps of a very stylish restaurant. Now the same time finds us in slacks and jackets. I should get a new one, but I can't find another with such roomy pockets, and a place to hang the hammer. Besides patches are honorable. We eat on the fly. Can't waste time feeding your face. A few ground crystals and a dash of mica improve the flavor of the bologna. I watch women shopping for their Sunday roast. Then I wander down to the "picnic" section.

Once we kept books in the bookcase. There was a time when there were empty ashboxes in the cellar. Gifts at one time were ties and perfume. Now they are hammers, chisels, and specimens. I can recall when stones were things that people in glass houses didn't throw. How times have changed! I sent a coat to the cleaners. It came back with an envelope tacked to it. It said they had been careful of the contents, but assumed no responsibility if any were missing. Puzzled I looked. There were a flock of gooey garnets, that I had been giving to unsuspecting people as lucky stones.

We used to know the latest dance steps, but now bulges are kept under control by weight lifting, and hammer throwing. Mountain climbing helps. We have had many hobbies, but not one ever dented the surface of our life structure. Mineralizing has changed the whole pattern, value and tempo. It makes for a richer existance. Often while chewing a sandwich, hudled on the lee side of a quarry or slope, and hugging the coffee bottle to try and get a bit of circulation back into the fingers, we will pity the folk who are dressed in their best, daintily munching tea sandwiches or promenading in shoes that hurt. Then memory brings to mind the man we met who watched us carefully chopping out some lovely green quartz crystals, and said, "you don't have to be crazy to do that, but it sure must help."

Club and Society Notes

Attention Secretaries—If you want your reports to appear in the July issue, they must reach us by June 20th—the Editor.

New York Mineralogical Club

American Museum of Natural History. New York, N. Y., Wednesday, March 19, 1947

The meeting was called to order at 8:10 P. M. Marshall Alpert, Dan Mayers, Carmine Venuto and William Zilbersher were elected to membership.

Mr. Yedlin announced that there would be a trip to the Boyce Thompson collection on March 22. An excursion to Roxbury, Conn., was planned for some time in April.

The temporary nominating committee nominated. for:

President—Frederick H. Pough, Ph. D.
First Vice President—Ralph. J. Holmes, Ph. D.
Second Vice President—Leo N. Yedlin
Secretary—Purfield J. Kent
Treasurer—Cecil H. Kindle, Ph. D.

O. Ivan Lee and George Ashby were nominated for directors by club members.

Dr. Holmes reported on several new publications of interest to club members including "Experiments in X-ray Irradiation of Gem Stones" by Pough and Rogers in the *American Mineralogist* Jan., Feb. 1947.

Two articles by Austin Rogers—"Uraninite crystals with a new form from Portland Conn." and "Uraninite and Pitchblende also in the *American Mineralogst* Jan., Feb. 1947.

Manganese and Lead as Coactivators of Red Fluorescence in Halite" by Murata and Smith in *American Mineralogist* Nov., Dec, 1946.

The speaker of the evening was Mr. A. N. Holden who spoke on "Growing Crystals from Solution." The crystals grown were of ammonium dihydrogen phosphate, a piezoelectric material, which is used by the Bell Telephone Co. for voice frequency filters. These filters will pass certain frequencies and cut out others thereby enabling several messages to be sent over the same wire, at the same time, at different frequencies, without interference. Quartz plates can also be used but quartz large enough and perfect enough for this purpose is becoming more difficult to obtain, so a substitute had to be found. The material selected had to have the necessary piezoelectric property and had to be suitable for growing large crystals, rapidly in the laboratory.

Many problems had to be met in the laboratory. There are no hard and fast rules for growing crystals and each chemical substance behaves very much as an individual and has to be treated as such. If a seed crystal is suspended in a solution, growth does not take place uniformly over the entire surface but a current is set up which moves up around the crystal and the bottom of the crystal grows faster than the top giving a stepped back effect. This can be eliminated by stirring the solution but this develops turbulence so it must be stirred very slowly.

The effect of even very small amounts of impurities such as chromium and tin have a marked and harmful effect on the crystals.

At the Bell Laboratories the crystals are grown by fixing a seed plate on an arm which rotates slowly in a solution of uniform temperature and then reversing the direction of rotation periodically so that growth is uniform. Material is added to the seed plate as pyramids at the four corners of each side of the plate and these pyramids get larger until they grow together forming one pyramid. In the solution used these crystals grow only on the pyramids so that on continued growth the crystal becomes elongated in the direction of the pyramids while the prism does not get any thicker.

The talk was illustrated with lantern slides and specimens.

Purfield Kent

Chattanooga Rocks & Minerals Club

The March 19th meeting was held at 7:30 in room 51, University of Chattanooga. After a discussion of a field trip to be held on the 22nd, the following officers were elected:

B. K. MacGaw, President (Geology Instructor, University of Chattanooga) Otto Gutenson, Vice President & Field Leader (U.S. G.S. on leave to T.V.A.); Mrs. Thomas B. Walker, Secty-Treas.; R G Roberts (US.G.S. on leave to T.V.A.) and Thomas B. Walker, (Chemist, Southern Chemical Cotton Co.) Co-Chairman Membership Committee; H. Thurnauer, Chairman Program Committee (Ceramic Engineer, American Lava Co.); George C. Olmsted, Chairman Publicity Committee.

The above field trip included the old tripoli mine at Black Fox, old galena digging on Lead Mine Ridge and manganese and barite deposit near Cleveland. At the Avondale Quarry an interesting deposit of Bentonite was inspected.

George C. Olmsted,
Pub. Com.
1129 James Blvd.
Signal Mountain, Tenn.

American Gem Society

(Northern Ohio Guild)

A regular meeting of the Guild was held on April 8, 1947, in the Hatch Building, Western Reserve University, Cleveland, Oho. A lecture by Dr. Henry F. Donner, of the University, was the main feature. His subject was "Physical properties; their use in identification and as sales tools."

Pacific Mineral Society, Inc. of Los Angeles, California

At the regular monthly meeting of the Pacific Mineral Society, Mr. Roy L. Cornell of the California Testing Laboratory gave a very interesting and instructive talk on the mineral Fluorite and its uses.

First, he gave a resume of the many uses of fluorite and of fluorine which is derived from it. He stated that a few years ago the principal uses were in iron and steel manufacture, where it is used to give fluidity to the slag, thus permitting a better metal separation. It is also used in the manufacture of aluminum. Formerly its chemical uses were of minor importance. However, the war and recent developments have changed fluorine gas from a laboratory curiosity to a commercial product. As a result of these developments, a whole new field of synthetic chemistry has been opened up and its use in the chemical field has increased tenfold.

Mr. Cornell then told of some of the properties of fluorine, stating that it is the most active and vicious of the elements. Liquid hydrogen and solid fluorine at 252° centigrade below zero unite on simple contact at this extremely low temperature and burn with explosive violence at 6000° Fahrenheit.

During the war it played a very important part in the manufacture of 100 octane gasoline, anhydrous hydrofluoric acid having been used as a catalyst in the Isomerization and Alkylation process which produced the greater part of the 20,000,000 gallons manufactured daily in the United States. Twenty-five years ago this same 100 octane gasoline was a laboratory curiosity and cost about $25 per gallon.

Fluorine has such an affinity for hydrogen that it even burns on contact with water by decomposing the water and uniting with the hydrogen, so that if a stream of water is injected into fluorine gas, it will burn like our ordinary fuel gas. Other substances which wlll burn in fluorine gas are steel, asbestos, glass, quartz and, it fact, almost anything. Fluorine is really the "savage" of the elements.

After mentioning some of its other uses such as being one of the oldest gems (having been used as an ornament from the earliest recorded time), its use in ceramics, in freon which is used in DDT bombs, refrigeration and many others, he discussed its occurrence as a mineral, explaining that fluorite seems to have no special preference for any kind of rock. It is found in igneous, metamorphic and sedimentary rocks from the Precambrian age down to the most recent geological formations, with the result that one is apt to find it anywhere. He told of the beautiful fluorite which carried the rich telluride gold ores in the Colorado mining district, where it was his job to seek the ore that ran $10 a pound and over, immediately after a shot was set off.

Mr. Cornell's parting advice was to keep our eyes open for fluorite, as the demand for it is increasing every day and a deposit might be found almost anywhere.

The meeting was held on April 11, 1947, at the Chancellor Hotel, Los Angeles, Calif.

Mrs. O. C. Smith
Publicity Chairman

State Mineral Society of Texas

The State Mineral Soicety of Teaxs had a very successful Mineral Show and meeting at the Plaza Hotel in San Antonio on Saturday and Sunday, April 5th and 6th. We believe that the guests were not just being polite but were sincere when they expressed the unanimous opinion that the gathering was a real success. We felt that way, too. Every one had a good time.

From a very successful standpoint, we gained sixteen new members and two renewals. I am happy to say that my own son without my knowledge paid his $2. and joined. I am glad as I would like for him to go into minerals more deeply than I will ever he able to.

Mr. and Mrs. Curry from San Angelo had a nice display there to represent their museum.

Mr. and Mrs. Joe Murphy, Mr. and Mrs. Loyal Humphries of San Antonio had the nicest display of polished stones. Most of these cabochons were from Texas material. Both Mrs. Murphy and Mrs. Humphries had jewelry that their husbands had made.

Dr. and Mrs. A. C. Osborn of Gonzales displayed a large collection of polished material, mostly Texas. He, too, had jewelry he had mounted.

Mr. Gault of Aqua Dulce had a nice collection of polished Texas agate.

Among others who displayed was Vance Tankersley of Miles, Texas; Mr. Burk of San Antonio, and our youngest member, Master John Egerton Smith of San Antonio, who is a protege of Miss Marge Cruze. Also right now, I wish to thank Miss Cruze for her wonderful help in arrangements for our Mineral Show. I can tribute our success to her.

Officers elected were:

J. J. Brown, President
Edith Owens, Sec.-Treas. for present time
A. E. Curry, Director
Joe Murphy, Director
R. E. Gault, Director

Mrs. Edith Owens, Sec.
380 So. 6th St.
Honey Grove, Texas

Georgia Mineral Society

At the April meeting of the Georgia Mineral Society, we were addressed by Dr. Horace G. Richards, Assistant Curator of Geology and Paleontology at the Academy of Natural Science in Philadelphia.

Supplementing with color slides his narrative on "Circling the Caribbean," Mr. Richards introduced us to many far places, and perhaps kindled here and there a spark of adventure.

J. Roy Chapman,
Corresponding Secty.
Box 701, Atlanta, Ga.

Cincinnati Mineral Society

The March meeting of the Cincinnati Mineral Society was held at the Cincinnati Museum of Natural History, on the 26th. After discussion of plans for the future, including the first field trip of the season; three new members were introduced by President Atkins.

The special subject of the evening was copper minerals. Various members of the Society had brought along specimens from their collections. These were passed around so that each one present could examine them closely. Mineral identity rather than specimen quality is being emphasized in these special subject programs. At previous meetings calcite and sphalerite have been the topics for exhibit and discussion. It is also our purpose to show minerals of local, or as nearly local as possible, origin; whenever that can be done.

The April meeting will be devoted to gem cutting and polishing, and final details of the field trip will be announced.

E. H. Sarles
2026 Elm Ave.
Norwood 12, Ohio

Los Angeles Mineralogical Society

The Los Angeles Mineralogical Society was fortunate in having one of its own members deliver a talk on "Feld tests for minerals'" at its March meeting. B. Gordon Funk, a local teacher of mineralogy and geology, showed us how physical mineralogy can be applied to specimens in the field and at home. His talk covered six physical characteristics of minerals as follows: 1. Those dependng upon cohesion and elasticity. 2. Specific gravity. 3. Light. 4. Heat. 5. Electricity and magnetism. 6. Those depending upon the action of the senses such as taste, odor, feel, etc.

Under cohesion and elasticity the various crystal formations of a mineral can be determined all influenced by cleavage, fracture, tensity, hardness, etc. The embryo mineralogist needs only have a coin, pocket knife and magnifying glass to estimate the crystallography and hardness relatively of a mineral. Thus if a mineral is capable of being scratched by the finger nail it could have a hardness up to 2.5 when scratched by a coin a hardness up to 4. when scratched by a knife blade a hardness up to 6. Above a hardness of 6 the minerals themselves would scratch glass or a knife blade. The color on a scratch plate would also help in the identification of some minerals.

Specific gravity is the relationship of a mineral's weight to that of the weight of a like volume of water.

Fluorescence, phosphorescence, luster, tarnish, color, all depend upon the optics of light.

The special properties of minerals in respect to heat include the following: fusibility, conductivity and expansion.

Many minerals can be identified in their behavior toward electricity being conductors or nonconductors while others show development of positive and negative charges when temperature is changed in a suitable manner. A few minerals belong to the magnetic class, capable of being attracted by steel magnets, while others are natural magnets and show the attracting power and polarity of a true magnet.

Last but not least is the identification by their action upon the senses of taste, odor, and feel.

A field trip was made the latter part of February into the San Bernardine Mountains, adjacent to Lucerne Valley. Some garnets were picked up by lucky members.

A. G. Weigel, Pub. Chm.
163 W. 66th St., Los Angeles 3, Calif.

Kitsap Mineral and Gem Society

Members of the Kitsap Mineral and Gem Society of this city, have put on display a beautiful collection of wood, jasper, plume (Priday Ranch, Ore.) carnelian, and other minerals which have been collected in the Pacific Northwest.

This display is in the Friedlander Jewelry Store on Pacific Ave.

Chas. F. Floyd
821 Pacific Ave.
Bremerton, Wash.

The Southwest Mineralogical Society

The Southwest Mineralogical Society presented its 10th. annual exhibit April, 5th. & 6th, in the Palestine Masonic Temple, 41 Pl. and Figueroa, Los Angeles, Calif.

Although it was the Easter holiday more than 800 people signed the guest register.

Due to the artful planning of the show committees, and the willing co-operation of all exhibitors, a spectacular and instructive show was enjoyed.

The judges were, Mrs. Jessie Quane for silver work; Richard W. Mitchell, lapidary; Ernest W. Chapman, Victor Arciniega, and Roy Cornell for minerals.

Mr. Chapman's magnificent mineral display was greatly appreciated but was not entered in competition.

The drawing for the fourteen beautiful prizes created intense excitement, the prizes were donations from generous dealers as well as members of the club.

Dealers displaying were, R&B Artcraft, E. R. Hickey, Ellsworth Beach, W. S. Shirey, and W. A. Felker of R & Laboratory; their high calibre exhibits added tremondously to the interest of the show. First prize blue ribbon winners are as follows, Mrs. Alwida Dartt, best crystal, also grand award for the most spectacular display; O. C. Barnes, lapidary craftmanship of Death Valley onyx lamps and bowls; A. C. Gustafson, faceted stones; C. A. Terry, faceted quartz pandaloque; Charles Cook, jewelry craftmanship; Mrs. Ola Mortenson, tooled copper pictures; Dr. P. A. Foster, educational mineral display.

Millicent Terry,
712 Anderson St.,
Manhattan Beach, Calif.

Mineralogical Society of So. California

Dr. Richard Jahns of the Department of Geological Sciences, California Institute of Technology, and Geologist with the United States Geological Survey, was the speaker at the April 14th meeting of the Mineralogical Society of Southern California held 7:30 P. M. at the Pasadena Public Library. His subject was "The Geology of the Pala Pegmatites, San Diego, California." There have been few mineral collectors in Southern California who have not, surreptitiously or otherwise, explored the mines and dumps at Pala with varying degrees of success. Dr. Jahns, therefore, had a most appreciative and attentive audience.

The pegmatites of the Pala area lie at the northwestern end of a long pegmatite belt extending from San Diego County to the Mexican border. These pegmatites, dipping gently to the west, vary in thickness from 5 to 40 feet. The key to the occurrence of the gem minerals, however, lies within the pegmatite itself rather than in its shape. The pegmatite consists first of a graphic granite underlain with either a layered rock made up of alternating garnet-rich and garnet-poor layers from 1/32 to 18th of an inch thick, or an albitized layer. It was Dr. W. T. Schaller in his study of this area who first brought evidence to the fact that this lower part of the dike was formed by replacement from the graphic granite itself. Tiny bits of quartz found in this lower section proved after microscopic study to have the same orientation as the quartz in the graphic granite.

Within the pegmatite are found lenses of massive quartz, some simple masses, others more complex with cores of massives quartz with giant crystals of spodumene surrounded by concentric rings of massive quartz and massive quartz with giant crystals of microcline. Careful mapping of the mines has shown that the pockets in which the gem material is found are closely related to these lenses of massive quartz and occurs along the bottom or foot walls of these massive quartz zones. The formation of the pockets Dr. Jahns explains in this way. The graphic granite was formed, then the lime rock at the expense of the granite, then came a dissolving away of the granite forming a pocket. Into the cavities thus made were deposited crystals of quartz, microcline, gem spodumene, kunzite, tourmaline, topaz, and beryl—later generation minerals of the same minerals represented in the pegmatites. Many of these minerals are very common to pegmatites, but here they were deposited late, in open spaces, and under quiet conditions so that clear, perfect crystal could form.

As for the future of this district, Dr. Jahns states that there is undoubtedly gem material yet to be uncovered. Lantern slides showing diagrams and pictures of the area highlighted this most interesting and informative lecture.

Mr. Ernest W. Chapman presented to the Society the letter addressed to the Berman Memorial Laboratory which will be sent together with the sum of $200 which the society voted to contribute to this fund. Members of the society felt that this was an opportunity to help in some small way in the advancement of a science that has given them as individuals much leisure time enjoyment.

Pauline A. Saylor
Covina, California

Joliet Mineralorist Society

A regulat meeting of the Society was held on April 16, 1947, at Joliet Township High School and Junior College, Joliet, Ill. The guest speaker was Lieut. Ho, of China, whose subject was "The geology and minerals of China."

Mineralogical Society of Southern Nevada

The month of April has been an active one for the members of the Mineralogical Society of Southern Nevada. Early in the month at their Instructive meeting in Boulder City, Nev., they heard two informative discussions; one on Geology as applied to Mining, given by Mr. Harry Fuller, well-known Geologist of the U. S. Br. of Mines, Boulder City, and the other on the mineral Magnesia, given by Mr. M. G. Mastin, Chemical Engineer, Boulder City, formerly of the Manhattan Project. Mr. Fuller brought out many useful points to prospectors by telling the uses of Faults in relation to ore bodies. His manner of explaining the origin of rocks and minerals was most interesting. Mr. Mastin was equally well received. He outlined the sources of magnesia, chemical properties, processing, and the many uses.

The business meeting on April 15, was highlighted by a sale of mineral and gem specimens and showing of color slides taken on the field trips to the Indian Petroglyphs near Nelson, Nevada, and the White Hills mining area. Mr. Boynton also included many slides of his trips to the Valley of Fire, and Upper Lake Meade, much to the delight of members and friends. The Club also made a two day field trip to Lavic, California, on April 20th, for jasper and, also to visit the volcanic cones in that area. Everyone came home wth the feeling that realization was greater than anticipation, at least in this case. Members at the meeting also received for their note books, a 7 page chart of *"Minerals and their Characteristics."* This idea of building a referenece book is a favorite of the Club as there are so many good articles published that all do not have access to, and some member of the Club will make sufficient copies for distribution to all members, and thereby we all will have a means of studying.

Winners of the Door Prizes at the April 15th meeting were: Mr. John Westen, who received a fossilized fern; Miss Nancy Woods, green garnets; and Mr. Harry Brenton, Snowflake Obsidian.

Guests at the meeting included Mr. and Mrs. Fred Gunther, Mr. Schultz of the Boulder City Camera Club, and Miss Cecile Fisher of Henderson.

Mrs. F. McMillan, Sec.
8501—118th St., Richmond Hill, N. Y.

Pomona Valley Mineral Club

The POMONA VALLEY MINERAL CLUB had as guest speaker for their April meeting Dr. Mildred J. Groesbeck of Porterville, California, who spoke on "Cameo Carving and Stone Sculpture."

Dr. Groesbeck listed the somewhat limited variety of shells used in making cameos and told in considerable detail the process used in carving these shells—those with deep pink, brown or orange linings are considered most suitable for cameos, to show the white designs in relief against the colored background. Dr. Groesbeck particularly emphasized that one need not be a professional to obtain a pleasing result. Designs from nature such as flowers, leaves and marine scenes are easier for the beginner to carve than heads which are the more conventional type of cameos.

She displayed many beautiful specimens delicately and exquisitely carved which showed the skill she has attained in this fascinating hobby. She also displayed a group of miscellaneous cameos which showed the different style of carving used by other artists.

Dr. Groesbeck strongly urged others to turn to cameo carving as a pleasant and not too difficult hobby. In discussing stone sculpturing which is more difficult and a bit hazardous, especially when working with granite, she cautioned against an audience and to always wear goggles, as chips that fly are dangerous even to the one using the chisel and mallet on the figure being made.

She mentioned talc or soapstone as being the softer and easier material from which especially good results could be obtained. Materials used in her display illustrating stone sculpturing included limestone from Death Valley, Calif., alabaster, purple fluorite, talc, granite and marble.

It would be difficult to give an adequate word picture of all specimens displayed, but one piece worthy of special mention was a polished yellow bowl made from a solid mass of calcite crystals about eight inches in diameter and four inches deep which was made entirely by hand. It was so nearly perfect it looked as if it had been turned on a lathe, but Dr. Groesbeck assured us it was all hand-made from start to finish; even the center hole being drilled by a series of small holes and the material gradually cut away by hand. By looking down into this center opening one could see where the tops of the crystals had been cut off.

At the close of the meeting many members took advantage of the opportunity to try a bit of carving on a small round cameo blank which had been prepared on a dop stick. It was found to be a bit harder than anticipated but entirely possible to be done by an amateur.

Edythe M. Thompson
Pub. Chm.

Queens Mineral Society

On Thursday evening April 3rd, 1947, the Queens Mineral Society celebrated the tenth anniversary of its existance at its headquarters, The messers W. Helbig and E. Maynard were responsible for the colorful decorations and arrangements for the dinner which was well attended.

Mr. Ed. Marcin spoke briefly on the early history and experiences of our society. He climaxed his talk by presenting the society with a scrap book containing photos and other records of club activities up to date, the preparation of which represented much personal effort.

The guest speaker was Mr. Arnold Hoffman, author of the book "Free Gold." Mr. Hoffman spoke on prospecting and mining in Canada, based on his personal experience over a twenty five year period. His talk was concluded with the projecting of several reels of colored film taken in the area discussed. Film of the Paricutin and Mona Loa volcanos in eruption concluded an enjoyable and interesting evening.

Wm. L. Stadler, Sr.
Secretary

Mineralogical Club of Hartford

Field Trips—Summer and Fall of 1947

June 1—Roxbury, Conn., Iron Mine and Garnet Mine
June 22—Silex Quarry Mystic, Conn.
July 19-20—Keene, New Hampshire. Leave 7 A.M.
August 10—Canaan, Conn.
August 31—Monroe, and Trumbull, Conn.
Sept. 20-21—Ellenville, N. Y. Leave 7 A. M.
Oct. 19—Gillette Quarry, Haddam Neck, Conn.
Nov. 16—Hale Quarry, Portland, Conn.
(Weather permitting)

Starting time of all trips except two day trips 9:30 A. M.

Note: Starting time two day trips 7 A. M. *on the dot.*

Starting place for all trips will be 249 High St., Hartford, Conn.

Those needing transportation or those having room to take someone, please call the following:

George P. Robinson, 7-9670 Hartford	16 Simpson Street
Robert Brandenburger 5-3365 Hartford	194 Otis Street
Harriet Wright 6-1133 Hartford	345 Barbour Street

Colorado Mineral Society

A regular meeting of the Society was held on April 4, 1947, at the Colorado Museum of Natural History, Denver, Colo. The guest speaker was Dr. C. E. Dobbin, chief regional petroleum geologist of the U.S. Geological Survey, whose subject was "Geologic evolution of the Rocky Mountain region" illustrated with kodachrome slides.

The Los Angeles Lapidary Society

The "Faceteers" an inner group, specializing in faceting, entertained the Los Angeles Lapidary Society at the regular monthly meeting held in the Griffith Park Playground Auditorium on April 7, 1947.

A wonderful display of faceted gems were shown, and unfinished gems in various stages were worked on by members at the individual faceting machines. A detailed description of every opeartion was thoroughly explained and demonstrated.

The "Jewelry" group organized in February with Carl J. Crouch as chairman. This group will meet the fourth Tuesday of each month at the Griffith Park Playground Auditorium at 7:30 P. M. In time, all phases of jewelry work will be demonstrated and discussed.

Last Chance Canyon was the location of the April field trip. Gossite, jasper, petrified wood and some opals are found here.

E. Grace Peters
(Pub. chairman)

Mineralogical Society of the District of Columbia

A regular meeting of the Soicety was held on April 18, 1947, at the U. S. National Museum, Washington, D. C. The guest speaker was Dr. Charles Milton, of the U.S. Geological Survey, whose subject covered the minerals in the vicinity of Washington.

New Jersey Mineralogical Society

A regular meeting of the Society was held on April 15, 1947, at Princeton University, Princeton, N. J. The speaker was Dr. Edward Sampson, of the University, whose subject was "Some experiences of a geologist under Gen-MacArthur."

North Jersey Mineralogical Society

A regular meeting of the Society was held on April 19, 1947, at the Paterson Museum, Paterson, N. J. The speaker was Peter W. Tyahla, whose talk covered the interesting subject—how gems are made for commercial use.

Newark Mineralogical Society

A regular meeting of the society was held on May 4, 1947, in the Newark Museum, Newark, N. J. The speaker was Cornelius Verburg, of Westfield, N. J., whose subject was an illustrated lecture on "Lapidary for the Amateur."

Maine Mineralogical & Geological Society

A joint dinner meeting of the society with the Astronomical Society of Maine was held on March 14, 1947, at the Lafayette Hotel, Portland, Me. The speaker was Dr. Noel Little, of Bowdoin College, whose subject pertained to atomic energy.

Marquette Geologists Association

A regular meeting of the Association was held on April 5, 1947, at the Chicago Academy of Sciences, Chicago, Ill. The guest speaker was Dr. J. Harlan Bretz, of the Geological Department, University of Chicago, whose subject was "Geological cave explorations."

Boston Mineral Club

A regular meeting of the Club was held on April 1, 1947, at the American Academy of Arts and Sciences, Boston, Mass. The speaker was the president of the Club, Gunnar Bjareby, whose subject was "Collecting minerals at New England Localities."

BIBLIOGRAPHICAL NOTES

The Mining Industry of the Province of Quebec in 1944:

The value of the products of the mines and quarries of the Province during the calendar year 1944 totalled $90,214,759 as compared with $101,859,559 in 1943, a decrease of 11.4 per cent. The decrease was distributed over the three classes of products—metals, industrial minerals, and structural materials.

163 pp., 4 pls.

Issued by the Department of Mines, Quebec, Canada.

Operation of the Illinois State Geological Survey: By M. M. Leighton.

An interesting report on the activities of the Survey. It contains 49 pages with 29 figures. (1946).

Issued by the Illinois State Geological Survey, Urbana, Ill.

A Program of Progress:

An introduction to the purpose, facilities and services of the Washington State Institute of Technology based on the human and industrial potentialities of the State of Washington.

21 p., 22 ilus. (Jan. 1947)

Issued by the State College of Washington, Pullman, Wash.

Greiger's New Price Lists:

Two new price lists totalling 31 pages have just been released by Greiger's, 1633 E. Walnut St., Pasadena 4, Calif. The price lists, which have some very nice illustrations, are devoted chiefly to lapidary machinery and supplies but fluorescent minerals, books etc., are also featured.

Jewelcraft's New Price List:

J. J. Jewelcraft, 915 E. Washington St., Pasadena 6, Calif., have just released their new price list which is devoted chiefly to lapidary supples but cutting material, books, magazines, etc. are also featured. It is a 10 page publication.

WITH OUR DEALERS

Fine Colorado golds and gold telluride are advertised by E. Mitchell Gunnell, of Denver, Colo.

A. G. Parser, Inc., of New York City, announces the arrival of a large shipment of emeralds.

Still—the Champ! is the claim of Stardust Gemhouse, of Phoenix, Ariz., in speaking of its Arizona Petrified Wood.

Note the long list of selected mineral specimens in the ad of Schortmann's Minerals, of Easthampton, Mass. They can also furnish Estwing mineral hammers.

A Brazilian agate special is a feature of Michigan Lapidary Supply and Research Co., of Birminghm, Mich.

Ceylon moonstone heads the list of good collectors items in the ad of Ward's, of Rochester, New York.

Frank Duncan & Daughter, of Terlingua, Texas, can furnish fine quality fluorescent black chalcedony.

A new advertiser is Mineral-Service, of Hillsboro, Texas, who announce a new fluroescent find.

Another new advertiser is Lloyd T. Mewburn of Banff, Alta., Canada, whose offering are some fine Canadian minerals.

E. B. Freeman, of Grand Junction, Colo., informs us that he has located a new find of pigeon blood agate.

A parcel from Ceylon—is the caption of the ad Robert Tesmer, of Cleveland, Ohio.

MaryAnn Kasey, of Prescott, Ariz., features in her ad some Arizona Mineral specimens.

J. J. Jewelcraft, of Pasadena, Calif., can supply a number of faceting laps.

Greiger's, of Pasadena, Calif., specialize in lapidary equipment and supplies.

Gemarts Company, of San Diego, Calif., have gone poetic—but they can also supply lapidary equipment and supplies.

We are told that the S-T Gem and Mineral Shop of Tujunga, Calif., had a grand opening and that many friends sent flowers and congratulatory messages—in addition to being present for the big event!

And still another new advertiser is the Belle Gem Company of Mount Vernon, N. Y. Of course the firm specializes in gems!

Allan Branham, of Lander, Wyo., specializes in jade and—note his interesting article in this issue!

Burminco, of Monrovia, Calif., list a number of interesting western minerals.

Harrison S. Cobb, Boulder, Colo., caters to discriminating collectors.

Two specials by the Keweenaw Agate Shop, of Ahmeek, Mich., should interest all readers.

Mineralized wood is this month's special of Ellis Minerals, of Hawthorne, Nev.

If you need any Northwestern Mineral specimens, contact Chas. O. Fernquist, of Spokane, Wash.

Westfield Lapidary & Supply Co., of Westfield, N. J., can supply a new type of horizontal unit.

The Western Trader, of Sacramento, Calif., has a special for this month.

Chas. E. Hill, of Phoenix, Ariz., is planning a long vacation so—stock up now!—is his advice.

Thompson's Studio, of Pomona, Calif., have Mojave Desert specials.

Loran E. Perry, of Pasadena, Calif., is the manufacturer of the Perry drill press and the Perry cut-off saw.

The Glendale Gem & Lapidary Supply Co., of Glendale, Calif., can supply a number of lapidary items.

More cutting material is featured by Mrs. B. F. Nonneman, of Salinas, Calif.

Stewart W. Hurlbut, formerly of Salmon, Idaho, is now located in Butte, Montana.

A new advertiser is Theodore's of Glendale, Calif. Note the ad.

The Pyramid Rock Mart (formerly Pacific Rock Mart) of Los Angeles, Calif., announces a new California find—Lemurian Agate.

Bet yor haven't any austinite in your collection! And we bet Fred Roberts Jr., of Monterey Park, Calif., has some in stock- Nuff said.

The Streamliner is as sturdy as a bulldog and as precise as a stop watch—says Hyatt Lapidary Equipment Co., of San Diego, Calif.

World's Minerals, of Oakland, Calif., can supply a number of mineral collections.

Llyod M. Demrick, of San Francisco, Calif., can supply micro-mount boxes, pneumatic life rafts, argon bulbs, etc.

The Earth Science Digest, of Omaha, Nebr., is a very interesting publication. Subscribe for it today!

A. J. Alessi, of Lombard, Ill., can supply beautiful Mexican wulfenite.

Bodvin's Magic Wishing Well Agate Shop, of Depoe Bay, Ore., specializes in earrings, watch fobs, etc.

The Desert Rat's Nest, of Encinetas, Calif., announces the arrival of many nice minerals.

Western Mineral Exchange, of Seattle, Wash., anounces the purchase of two fine mineral collections.

A. W. Killick, of Baker, Ore., has some beautiful iris agate.

A gay-lussite from Trona Lake, Calif., can be obtained from Universal Minerals, of Los Angeles, Calif.

Duke Research Laboratory, of Hot Springs, N. Mex., announces a quick qualitative analysis course.

Maricopa Gem & Mineral Mart, of Morristown, Ariz., has still in stock some of those fine thin coated Arizona agates.

Another new advertiser is George Sassen, of New York City, who has a complete line of inexpensive mountings and findings.

Hugh A. Ford, of New York City releases his 12th list of fine minerals from an old collection.

Nevada minerals direct from the mine is a feature of John and Etta James, of Tonopah, Nev.

Another new advertiser is Armstrong Jewelry and Casting Co., of Miami, Ariz., who can supply cast rings and cut stones.

A list of interesting minerals for the collector is featured by John S. Albanese, of Newark, N. J.

Clarence A. Ames Co., of Portland, Ore., has a special offer on cutting material.

Still another new advertiser is Ace Lapidary Co., of Jamaica, N. Y., who can supply Australian opals in all shapes, sizes and qualities.

George T. Davey, of Van Nuys, Calif., is with us again. See his interesting ad.

Australian cutting opal. In Green, Blue, Red Fire and mixed colours. N. H. Seward, "Opal House," Melbourne, Australia, now has considerable supplies.

Ted Schoen, of Mt. Vernon, N. Y.; informs us that his Magni-Focusers will be shown at the coming Santa Barbara Mineral Show (May 23-25). They will be displayed by B. E. Sledge Sr., who owns the Sterling Shop of Hayward, Calif., who will have an exhibit at the Show.

NOTES ON CURRENT MINING ACTIVITY IN CALIFORNIA

CALAVERAS COUNTY

Mountain King mine near Hobson, operated by Stewart & Nuss, 410 Thorne Ave., Fresno, has completed its primary grinding unit, and milling operations have started. Approximately 600 tons daily are run thru mill. Ore mined by power shovels, trucked to crusher. Thomas B. Rice, supt., in charge of 30-man crew.

IMPERIAL COUNTY

Madre Mine, in Cargo Muchacho mining dist., 4 mi. E of Ogilby, is under development by Kenneth Holmes, Yuma, Ariz., who is sinking 2 shafts between Madre No. 1 and No. 2 shafts, with an 8-man crew.

American Minerals Co., Ogilby, Calif., is operating sericite schist deposits 4 mi. E. of Ogilby; 3 men employed.

INYO COUNTY

Cerro Gordo mine, in Cerro Gordo mining dist., 5 mi. E of Keeler; owner, Silver Spear Mining Co., Los Angeles; lessee, W. C. Rigg, Santa Monica. Mine under development; diamond-drilling on 500-, 600-ft. levels. Recently shipped

several cars lead-silver ore; 8 men employed.

Santa Rosa mine, in Lee mining dist., E slope Inyo Range, 26 mi. E of Keeler. Owner, Santa Rosa Mining Co., J. R. LeCyr, pres. Mine dumps sold to Louis Warnken, Lone Pine, Calif., who is shipping 250 tons per week of lead-silver ore to American Smelting & Refining Co.'s smelter at Selby, Calif.

KERN COUNTY

Rosamond feldspar mine, 2 mi. NW of Rosamond, a station on SPRR. Owner, N.W. Sweetser, Rosamond. Developed by 75-ft. shaft; installing 20-ton grinding plant; 3 men employed. Plan to ship feldspar to Los Angeles Chemical Co., Los Angeles.

MONO COUNTY

Insulating Aggregates Co. has put into operation its 70-ton pumice mill on property formerly operated by California Quarries Co. 6 mi. N of Laws. Plant is owned by G.M.M. Grant of Los Angeles. L.B. Eaton in charge of operations; F.L. Murphree of Bishop, mill supt; 6 men employed.

Virginia & Dog Creek Placers, 6 mi. S of Bridgeport, is under lease of Sumwar Dredging Co., Oroville. Operating Lima dragline dredge, capacity 200 cu. yd. per hr. Supt., J. H. Frasher; 12 men employed.

Pacific Pyrophyllite deposit, on W slope White Mts., 17 mi. N of Laws; Wright H. Huntley, pres. and mgr., Big Pine, Calif. Shipping pyrophyllite to Los Angeles; 6 men employed.

RIVERSIDE COUNTY

Mission mines, in Monte Negro mining dist., S slope Dale Mts., 42 mi: NE of Indio; owner, Mission Gold Mines, San Diego lessee, W. C. O'Conner, Hollywood; Geo. Nordenholt, consulting engr. Development, 650-ft. shaft; 6 men employed sinking shaft, excavating for 50-ton cyanide mill.

Gold Rose mine is in Dale mining dist., on S slope Dale Mts., 45 mi. NE of Indio; owners, Dale R. Holmes, Long Beach: C. L. Anderson, San Bernardino, C.A. Feletta, San Bernardino. Developed by 200-ft. shaft; driving shaft on 200-ft. level; 4 men employed.

Outlaw mine is in Black Hills, Monte Negro mining dist., 48 mi. NE of Indio, owners, James Hayes, Dr. H. M. Farnham, Culver City, Calif. Developed by 127-ft. shaft, open cuts, along porphyry outcrop; 3 men employed on development work.

SAN BERNARDINO COUNTY

Carbonate King zinc mine, in Ivanpah Mts. on Kokoweef Pk., 5 mi. SW of Mountain Pass. Owner, Crystal Cave Mining Co.; Herman Wallace, Jr., secy., Los Angeles; lessee, J. Q. Little, Clark Mtn. P.O. Mining and shipping to International Smelting Co., Utah 1 50-ton car per week, reported to average 35% Zn. 6 men employed.

Marter-White Mining Co.'s clay deposit 5 mi. N of Oro Grande and 3 mi. E. of Bryman Siding on Santa Fe RR, is shipping 6 cars per mo. to Sierra Talc Co.'s grinding plant in Los Angeles; also, shipping high-grade calcium limestone from Lucerne limestone deposit, 6 mi. N of Lucerne P. O., to Los Angeles; material is ground and sold for whiting. 4 men employed.

SAN DIEGO COUNTY

Pioneer pyrophyllite deposit, 1 mi. E of Rancho Santa Fe; operated by Pioneer Pyrophyllite Producers; B. F. Mathews, mgr. Ore mined from open cut, loaded into trucks, hauled to Chula Vista; ground in Tycrete Chem. Co's. mill to-325-mesh and shipped to Mefford Chem. Co., Los Angeles, for insecticide. 6 men employed; present production 50-60 tons ground pyrophyllite daily.

SHASTA COUNTY

The Coronado Copper & Zinc Co. has 20 men employed at Afterthought mine near Ingot developing Zn-Cu ore bodies; Lyttleton Price in charge.

TRINITY COUNTY

Rex hydraulic mine, operated by Perry Bennett and one man on E Fk. Weaver Cr., near Weaverville. Mine recently purchased by V. B. Bennett, Sacramento, from Willis Woodbury, Weaverville.

Swanson Mining Corp. hydraulic mine nr. Salyer is being operated by A. J. Oyster and associates, who have 16 men working 2 shifts making tests.

The Rocks and Minerals Association

(Members All Over the World)

President, Oscar W. Bodelsen
219 E. Main St.
Mt. Kisco, N. Y.

Vice-President, Ronald L. Ives
Univ of Indiana, Bloomington, Ind.

Director of Tours, Richmond E. Myers
Dept. of Geology,
Muhlenberg College, Allentown, Penn.

Secretary-Treasurer, Peter Zodac
Box 29, Peekskill, N. Y.

Organized in 1928 for the increase and dissemination of mineralogic knowledge

To stimulate public interest in geology and mineralogy and to endeavor to have courses in these subjects introduced in the curricula of the public school systems; to revive a general interest in minerals and mineral collecting; to instruct beginners as to how a collection can be made and cared for; to keep an accurate and permanent record of all mineral localities and minerals found there and to print same for distribution; to encourage the search for new minerals that have not yet been discovered; and to endeavor to secure the practical conservation of mineral localities and unusual rock formations.

Ever since its foundation in 1928, the Rocks and Minerals Association has done much to promote the interest in mineralogy. It has sponsored outings, expeditions, formations of mineralogical clubs and the printing of many articles that have been a distinct contribution to mineralogy.

Those of our readers who are members of the Association can rightly feel that they too were sponsors of these many achievements that have helped to give mineralogy a national recognition. Among your friends there must be many who would like to have a part in the Association's work—to share with you the personal satisfaction, the pleasure, and the benefits of membership. Will you give your friends this opportunity to join the Association by nominating them for membership?

Each new member helps to extend the Association's activities—helps to make your magazine larger, better, and more interesting, and above all assists in the dissemination of mineralogical knowledge.

Some advantages of membership: All members in good standing receive:

(1) **Rocks and Minerals,** a monthly magazine. (2) A member's identification card that secures the privileges of many mines, quarries, clubs, societies, museums, libraries. (3) The right to participate in outings and meetings arranged by the Association. (4) The right to display a certificate of membership and to place after their names a designation indicating their membership or to advertise membership on stationery, etc. (5) The distinction and the endorsement which comes from membership in the world's largest mineralogical society.

Mineralogical clubs which subscribe for **Rocks and Minerals** also become affiliated members of the Rocks and Minerals Association and enjoy all the advantages which such an affiliation affords.

A number of clubs hold membership in the Association, participate in the annual outings, and co-operate in many ways in furthering the aims and ambitions of the Association.

Affiliation with the world's largest mineralogical society cannot fail to increase membership, enlarge circles of acquaintanceship, and stimulate a keener interest in mineralogy.